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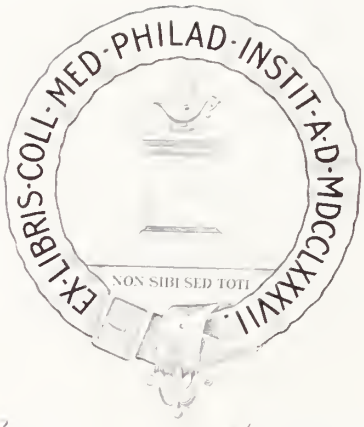

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Immunological Specificity[1]

By SIR F. MACFARLANE BURNET, O.M., F.R.S.[2]

IMMUNOLOGICAL specificity is what makes immunology, whether clinical or experimental, interesting. Why should one man be dangerously sensitive to lobster meat when he can eat almost any other food with impunity and when 99% of his fellows can tackle any sort of seafood without regard for the consequences? That question in a sense defines the sort of problem we have to deal with and leads the way to a rather precise definition of specificity at the molecular level.

When we speak of specificity we are in general concerned with one or both of two fields of biochemistry, enzymology and immunology. There are specific relations between enzyme and substrate and between antibody and antigen. Both can be expressed in similar terms and in the view of many immunologists the likeness between the two sorts of situation is more than superficial. In general we are dealing with two sets of substances, A^1, A^2, &c., on the one hand, and B^1, B^2, &c. on the other. A specific relation is shown when one substance A^1 will unite and/or react with B^1 much more readily than with B^2, B^3 or any other of the B group substance. Similarly B^1 is more readily affected by A^1 than by A^2 or any other substance of that group. In practice we have to define "much more readily" in quantitative terms convenient for the practical method of testing for union or reaction.

In immunology we can study specificity in what we may call positive and negative aspects. We can immunize a rabbit with such and such an antigen and find that its serum has become capable of precipitating the antigen or of neutralizing its toxic or other activity. To check on the specificity of that antibody we can test the serum against as many other antigens as we wish and measure the degree of cross reaction by finding how much, if any, of the antibody is precipitated per mg. of each antigen. That is the positive approach.

The other experiment we can try is to take some newborn rabbits and inject them with the antigen A that we are interested in, following this by another inoculation of the same antigen in say two months' time. At three months of age we can compare these rabbits with some untreated litter mates. If we inject both groups with A, no antibody is produced in the treated rabbits—the inoculation on the first day of life has rendered them *tolerant*. But if an unrelated antigen B is given, there is equal production of antibody in both groups. Clearly we can use such comparisons between rabbits rendered tolerant to A and normal

[1] Hira S. Chouké Lecture IV, College of Physicians of Philadelphia, 7 March 1962.

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rabbits, to sort out the relative specificity of A in relation to other antigens of the same general class. In the first section of my lecture I want to describe a few typical experimental situations which exemplify these positive and negative types of specificity. In the process I hope you will gain a general picture of the nature of immunological tolerance because I believe this is the central phenomenon for any understanding of the basis of immunology.

1. The Homograft Reaction

If we want to be quite sure whether two brothers are identical twins, the final test is to observe whether they will each accept small skin grafts from the other. Apart from quite exceptional circumstances, any two men or laboratory animals that are not genetically identical will reject such cross skin grafts. For experimental study of this phenomenon we need a supply of identical twins. There is, in fact, an armadillo which regularly produces four identical twins at a birth, but in practice it is more convenient to use mice of a closely inbred pure strain of which many are now available. A, C3H and C57B1 are well known examples. In a properly managed colony any mouse of such a pure strain will accept a skin graft from any other mouse of the same sex. In some strains females will reject a male skin graft, hence the desirability of working with animals of uniform sex.

To simplify discussion let us speak of three strains of mice, A, B and C, each distinguishable by its coat colour, white, black and brown respectively. If we graft to A mice skin from animals of each strain, A will take uneventfully, B and C will appear to take for about a week and then will begin to shrivel and will eventually be rejected in about 12 days. If a second set of grafts is tested on the same recipients, we get the results shown in Table 1, an accelerated rejection clearly visible in six days when skin from the *same* donor is applied a second time. This is an indication of the specificity of *homograft immunity.*

TABLE 1

To Show the Behaviour of Skin Grafts in Pure Lines of Mice

Recipient	1st Set Donor	Result	2nd Set Donor	Result
A	A	Ac	B	R+
A	A	Ac	C	R+
A	B	R+	B	R+++
A	B	R+	C	R+
A	C	R+	B	R+
A	C	R+	C	R+++

Ac = accepts graft without reaction.
R+ = rejection. R+++ = accelerated rejection.

TABLE 2

Tolerance to Homografts in Pure Line Mice

Recipient	Treated Neonatally with	Tested with Skin from		
		A	B	C
A	—	Ac	R+	R+
A	B	Ac	Ac	R+
A	C	Ac	R+	Ac

Ac = accepts graft without reaction.
R+ = rejection. R+++ = accelerated rejection.

For the demonstration of tolerance we use the same mouse stocks and adopt the technique of Medawar and his collaborators. We take a series of newborn A mice and before they are 12 hours old inoculate them intravenously with cells from spleen and kidney of a late embryo of strain B. At that age B cells can become implanted in the A mouse and some of them probably persist indefinitely. They persist because the cells of the immature host have no capacity to react against them and in one way or another the capacity to do so, that would normally develop as the young animal ages, fails to eventuate. There are ways by which the continuing presence of the foreign cells can be established but these are not relevant for our present purpose. What we *are* concerned with is to test the mice as they grow up to see how they react to transplanted skin from each of the three mouse strains we are using. Table 2 shows the findings. There is, in Medawar's phrase, a specific immunological tolerance developed toward tissues from mice whose cells have been implanted in the neo-

natal animal that is subsequently tested as recipient.

2. Graft versus Host Reactions

In the early work by Medawar's group, they found it very difficult to obtain recipients suitable for testing because of the high mortality that followed intrauterine or neonatal injection of adult cells from a different strain of mice. Eventually these deaths were found to be due to an attack by the mature cells of the graft on the immature tissues of the host, a so-called graft-versus-host reaction. This has now become of great potential importance and many studies have been made on the phenomenon using pure line mouse strains. I prefer, however, to use our own work with chick embryos as the most convenient example.

We take a chick embryo at the 12th or 13th day of incubation and place on the chorioallantoic membrane (CAM) one-tenth of a millilitre of heparinized blood from an adult chicken. After four days' further incubation we remove the membrane and examine it against a black background. It will probably show 30 or 40 discrete foci about 1 mm. across which appear white against a black background. Microscopically these foci appear as accumulations of a variety of mesenchymal and epithelial cells which we have interpreted as arising from the interaction of a large or medium lymphocyte (LML) from the adult donor with antigenic material in the cells of the CAM. The main effect of the interaction is to let loose something which stimulates adjacent embryonic cells to proliferate. There are many interesting facets of this phenomenon but I wish to deal only with its specificity. As in mouse experiments this requires that there should be available pure lines of chickens.

Fortunately we have available two sublines of highly inbred white Leghorn chickens which we believe can be described genotypically by using three alleles, A, B and C, at a single locus (Burnet and Burnet 1961). All the combinations except BB have been recognised and tested. Table 3 shows the sort of results obtained when we test adult cells of known genotype on CAMs from eggs of known parentage. The rules are easy to see. Cells produce foci only when the CAM on which they are deposited contains an antigen not present in the bird from which they were obtained. As in blood group work, we assume that allele directly determines the presence of a corresponding antigen in the phenotype. Any of these blood cells placed on an outbred embryo will give the full count of foci and it is evident that there are several other genes and antigens beyond A, B and C. We fancy, however, that it may not be a very large number.

TABLE 3

The Interaction of Chicken Leucocytes on the Chorioallantoic Membrane: Immunogenetic Relationships

Leucocytes from Genotypes	CAM Genotypes				
	AA	AB	AC	BC	CC
AA	−	++	++	++	++
AB	−	−	++	++	++
AC	−	++	−	++	−
BC	++	++	++	−	−
CC	++	++	++	++	−

++ = counts with a median 20–50.
− = CAMs showing 0 or < 3 foci:

One thing should perhaps be emphasized about these results. The foci are well developed in four days and are visible in two. From the number of cells and the general structure of the focus, it is clear that the focus is initiated within a very few hours of the deposition of the leucocytes. The decision whether or not a foreign antigen is present must therefore also be made quite rapidly by those cells which are competent to initiate a focus. This capacity of a single cell to recognise whether or not it is on foreign soil is, I believe, of much importance for immunological theory. I do not believe that there is any conceivable explanation which does not admit that in some way or another the population of cells from an AA bird carries information that allows a proportion of cells to react with antigens B and C, antigens with which the AA bird can presumably never have

experienced. This is the essence of a selection type immunological theory.

Nevertheless there are many difficulties still to be resolved before the detailed form of an acceptable selection theory of immunity can be shaped. When donor cells multiply in the spleen of the embryo, they retain some at least of their capacity to produce foci on another CAM. But they do not retain the specificity that we ascribe to their ancestors. If AA cells are inoculated intravenously into an outbred embryo (OB) and cells from the enlarged spleen after four or five days are tested on different types of embryo, the results in Table 4 are obtained (Burnet and Burnet 1960). After passage through outbred embryos, the cells have gained a power to react against CAM of their own original genotype.

This leads us to look at the conditions for tolerance in this system. Two experiments may be described. In the first we inoculate a group of AA embryos with a suspension of spleen cells from several CC embryos. Those which survived hatching were kept for three weeks or longer and then bled. The blood was tested in the usual way on selected embryos of known genotype. The results of a set of such experiments are shown in Table 5.

In another experiment, Hilgard et al. (1962) injected a series of outbred embryos with suspension of embryonic spleen cells derived from 77 embryos, also outbred of hybrid white Leghorn x black Orpington stock. Cells from these embryos taken three weeks after they hatched produced minimal numbers or no foci on all CAMs tested. Untreated control chickens of the same age gave blood capable of producing the full standard count. On continuation of the tests, however, the leucocytes became progressively and rather rapidly more effective till by the 7th and 8th week of age the average count in relation to the number of LML was only slightly lower than would be expected from normal birds of the same age.

It appears therefore that tolerance is associated with the elimination of all lymphocytes which are capable of reacting with antigens genetically normal to the bird or produced by cells which can become permanently implanted in it. In Hilgard's experiments the return of cellular competence presumably coincides with the gradual elimination of the foreign antigens. There is a real possibility that the entry of a large number of foreign antigens, each presumably derived from only a small number of implanted cells, may have been responsible for the subsequent elimination of the foreign cells, as a result of

TABLE 4

Change of Specificity of Immunologically Competent Cells on Passage through Outbred Embryos

Cells tested	CAM Genotypes		
	AA	AB	OB
Original AA (blood leucocytes)	−	++	++
Passage AA (from enlarged embryo spleen)	++	++	++

++ = counts with a median 20–50.
− = CAMs showing 0 or < 3 foci.

TABLE 5

Tolerance of AA Chickens Treated before Hatching with CC Cells

Donors of Leucocytes	Counts on CAMs of Genotypes		
	CC	CA	CC, CB, BB
AA	0%	0%	0%
CA	100%	100%	25–50%
Experimental 5–9 weeks	14− 100%		11− 3± 6+ 55%
10–15 weeks	4− 1± 3+ 50%		15− 5± 29+ 26%

− = counts < 2% of the random median count
± = counts 2–5% of the random median count
+ = counts > 5% of the random median count

The percentage of negative (−) counts is shown in the upper rows as the theoretical expectation for unmodified AA leucocytes and for leucocytes from birds of the genotype CA.

In all tests the leucocytes used gave counts on random embryos whose median values ranged between 6 and 34.

development of cross-reactivity. More experimental data, however, would be needed before the possibility could be developed.

3. Antibody Production against Soluble Antigens

For our final example we can return to consider the rabbit producing antibody against a purified protein antigen, crystalline BSA (bovine serum albumin). As I have already indicated, if we inject BSA into a rabbit three months or older, antibody will appear in the circulation. It is recognised by its capacity to precipitate with a solution of the antigen, to agglutinate tanned red cells coated with antigen, or *in vivo* to accelerate the elimination of antigen labelled with I^{131} or other suitable isotope from the circulation. When a high titre antibody against BSA is tested against related antigens such as human, pig or sheep serum albumins (HSA, PSA, SSA), cross reaction occurs but the amount of precipitate is less than is obtained with the homologous reagents. Quantitative differences can thus be used as a measure of the degree of specificity of the serum and conversely of the extent of immunological relationship between the various antigens.

To obtain a deeper understanding of immunological specificity as applied to this system, there are three important additional approaches. The first is to absorb the serum *in vitro* by precipitating with optimal amounts of antigen, either homologous or heterologous, removing the precipitate by centrifugation and testing the supernatant for residual antibody against each of the antigens. This will normally show that the homologous antigen will remove antibodies from the serum but any of the others will leave residual power to react with BSA and perhaps one or more of the other serum albumins. This has the important implication that in this or any other antiserum against a single antigen, we are dealing with a mixture containing distinct sub-populations of antibody molecules, not with a single chemical species "anti-BSA".

The second approach is to study the secondary response. If a rabbit immunized with BSA some months previously is given another injection of the antigen, there is a rapid rise in antibody titre, the secondary or anamnestic response. Some very interesting results have emerged from studies of the effect of giving one of the related antigens, HSA for example, instead of BSA as the secondary stimulus. Dixon and Maurer (1954) found that HSA could provoke in such an animal primarily immune to BSA an increase in titre of secondary type against both BSA and HSA. Moreover, suitable analysis by absorption experiments showed that there were at least three populations of antibody molecules, (a) reacting with BSA only, (b) with HSA only and (c) reacting equally with BSA and HSA. These findings are probably rather important for the understanding of specificity but we can leave their discussion for a little till we have dealt with the third approach by way of tolerance.

If we take newborn rabbits and give them a standard dose, 100 mgm/Kg of BSA, they will become tolerant, i.e. if within the next three months another dose of BSA is given there will be no antibody response, although normal rabbits of the same age readily produce antibody and the tolerant ones are normal in their response to bovine gamma globulin (BGG), an unrelated antigen. If we have such a tolerant animal it is of obvious interest to find whether it is also tolerant to related antigens. For this we can consider HSA, PSA and SSA, and in addition BSA which has been modified by attaching a small molecular grouping such as sulphanilamide to BSA. We can call this BSA-D. If we inoculate tolerant rabbits we find according to Weigle, Boyden and others that the rabbits are fully tolerant to the closely related antigens SSA and BSA-D, despite the fact that these both have antigenic patterns lacking in BSA. No antibody against either BSA or either of the other antigens is produced (Weigle 1961a, 1961b). On the other hand with the less closely related PSA and HSA tolerance is broken down. AntiHSA, for instance, is produced in all, and at the same time a small but significant degree of reactivity

against BSA appears. With a completely different antigen such as BGG no antiBSA appears. It whould be noted that where artificial antigens of the BSA-D type are used, the usual result is full tolerance, but Cinader and Pearce (1958) record two rabbits tolerant to BSA which produced a highly specific serum against BSA-D only, the other four of the group being nonreactive.

These examples should give a general picture of the sort of findings which modern immunological techniques provide in this field of specificity. In the second half of my lecture I want to discuss what sort of a theoretical background to immunology these results demand. I can say in advance that no fully satisfactory interpretation is yet available.

General Discussion

In any theoretical discussion of tolerance and specificity, we need to keep in view what are the basically important findings which must be explained. More particularly we have to emphasize those results which are not covered by the standard Landsteiner-Haurowitz-Pauling theory of antibody production which has on the whole served the practical purposes of immunology very well. I am strongly in favour of an elective or selectionist theory of immunity and to support it I am specially interested in the following findings.

1. An animal and in the limit a single cell can recognise whether or not a potential antigen is or is not part of its own complement of chemical patterns.
2. If a suitable foreign antigen or group of antigens is introduced during embryonic or very early neonatal life, it will subsequently be treated as if it were native to the body. No immunological reaction will be developed against it.
3. To maintain immunological nonreactivity, it appears to be necessary for the antigens in question to remain constantly present in the body.

It would not, I think, be appropriate nor would time permit me to go into all the reasons why these findings influence my choice of a selective rather than an instructive theory of immunity. Instead I shall assume that by this time most people interested in immunology are aware (a) of the general character of selective theories and (b) of the fact that any biological theory is valuable only insofar as it opens up experimental possibilities of proving it wrong in whole or in part. I shall merely attempt therefore to give an outline of the interpretation which at the present time I believe is most effective in correlating the recorded findings. It will necessarily be couched in rather dogmatic terms.

1. Immune responses are the primary function of lymphoid cells including large, medium and small lymphocytes, plasmablasts and plasmacytes. From cells resembling large lymphocytes there are two descendant lines, one to medium and small lymphocytes, the other to plasma cells. The latter is not shown until after birth in normal circumstances.
2. The ability of lymphoid cells to differentiate between self and not-self components is based on the existence of a range of preformed patterns sufficiently extensive to allow at least initial reaction with any foreign antigen. These patterns are inheritable at the somatic cell level and are under the control of some genetic mechanism. It is not known how these patterns are distributed amongst the various clones of lymphoid cells present before birth. We now favour the presence of a moderate number of potentialities on each of a moderate number of clones rather than to assume either that each clone carries one or at most two specificities, or on the other hand that every lymphoid cell contains all the information needed to recognise any foreign antigen. What I would emphasize is that I can see no logical escape from accepting it as axiomatic that in the lymphoid cells of the body there is preformed information adequate to allow the recognition of any foreign configuration *as* foreign.
3. If a cell or clone possesses the capacity to produce *n* patterns either in the form of receptors at the cell surface or as the active

sites on antibody molecules, then we postulate that at some time or another any one of these patterns will be accessible to contact with the corresponding antigenic pattern. The result of such contact will depend on the physiological state of the cell and of the internal environment where it finds itself. In the immature, embryonic or neonatal animal, contact results in a "permanent" repression of any further production of that receptor, presumably by a mechanism involving the cell genome and perhaps analogous to one of the progressive series of repressions that must take place in the process of cellular differentiation. The possibility that this repression acts by actual elimination of the embryonic cell and clone is still not wholly excluded.

Once the mature stage is reached contact with antigen corresponding to an accessible receptor results in a "locking" of the mechanism for its production into a presumptive activity which effectively represses all other potentialities. Further contact with the antigen will provoke the two characteristic features, proliferation and plasma cell production. The latter are the predominant and perhaps the only producers of typical antibody.

4. To account for the various phenomena associated with repeated antigenic stimulation, either with a single pure antigen or with a second antigen cross reacting to some extent with the first, we must I think evoke a limited potentiality of mutation (or any other type of inheritable change) and selection.

The point to be emphasized is that in the process of immunization there is in addition to the production of antibody-producing cells and antibody, an increase in the number of cells which can give rise to further antibody-producing cells. This can be demonstrated by various types of transfer of lymphoid cells to tolerant recipients. On theory it is essentially these stem cells which are stimulated by antigen and at the height of the antibody response there are many thousands of them. If there are potentialities of mutation in the stem cells—and according to one theory the quality of control of antibody pattern by the genome must be highly mutable—there will be a selection as antibody producers of those cells reacting most readily and completely with the antigen being provided.

These hypotheses allow a relatively detailed interpretation of the findings in regard to breakdown of tolerance to soluble proteins and to skin sensitizing chemicals like picryl chloride.

We may consider first the explanation it offers of Weigle's finding that tolerance to BSA can be broken down by antigens which cross react rather poorly with it, e. g. HSA. Suppose we regard the two significant antigenic patterns as AB and AH, the antibody (or receptor) patterns as ab and ah. In the tolerant animal the patterns are inhibited but we must assume that ah patterns are nonreactive to AB and are present in appropriate cells. On stimulation with AH, cells are produced with ah and in addition mutation will see to it that there are ah^1, ah^2 &c. modifications, and in a proportion of these ah^x will produce antibody reacting sufficiently with AB to indicate a breakdown of tolerance. The possibility that ab and ah^x may be carried by the same cell or clone might have interesting effects and a similar situation could perhaps be responsible for Attardi et al's findings (1959) in regard to double production of antibody against bacterial viruses.

Rather closely related to these problems are the changes in specificity as between delayed hypersensitivity reactions and antibody, both being induced by the same antigen. If we take two haptenes (G, H) and two typical proteins like guinea pig albumin (A) and egg albumin (B) and assume both G and H produce contact dermatitis, while GA, GB &c. will give delayed hypersensitivity reactions in appropriately treated guineapigs, then according to Benacerraf and Gell (1961) the cross reactivities are as shown in Figure 1. These results may be compared with the tolerance results with BSA or HSA combined with a dye or sulphanilamide haptene from Boyden and Cinader. It will be

SKIN REACTIVITY AND ANTIBODY

IMMUNIZING AGENT	NORMAL ANIMAL						TOLERANT TO A	
	G	H	GA	GB	HA	HB	GA	HA
G	■		+	+	−	−		
H		■	−	−	+	+		
GA			+	+	−	−	−	−
GB			+	+	−	−	+	−
HA			−	−	+	+	−	−
HB			−	−	+	+	−	+

FIG. 1. Cross reactivity of two skin reactive haptenes G and H linked to proteins A or B.

Black indicates skin reaction with the reagent shown in the top horizontal line.

+ antibody present in serum.

− no antibody.

Immunizing agent (vertical row) indicates reagents used to immunize or sensitize the animals.

seen that tolerance is seen irrespective of whether A is or is not modified by the attachment of G or H. Contact reaction is regarded as the same as delayed hypersensitivity to G (skin protein) complex, and is specific for the carrier, i.e. is determined mainly by the complex modification of the carrier associated with the attached haptene. On the other hand most of the reactivity of the serum is directed toward the haptene. There is the ghost of an idea here that the preexistent patterns in lymphoid cells are not concerned with unbiological configurations like picryl dinitrofluorobenzene or sulphanilamide. They are concerned primarily with unfamiliar configurations of substances commonly present in the body. The initial response is by cells with patterns sufficiently like the modified area of the carrier protein to give mutation and selection "something to work on". Tolerance by hypothesis is concerned only with preexistent patterns, delayed hypersensitivity appears earlier and appears to be a more primitive type of reaction than antibody production.

We can picture the newly born animal as being supported with cells carrying only a limited number, possibly no more than a few hundred reactive patterns, there only because they do not react with any of the body components. Amongst them, however, are enough to react with most of the likely invaders and as soon as antigens become common, selective processes will ensure more and more patterns with a progressive increase in the number of configurations which can be recognised as foreign. The early contact with the casual pathogens of the bowel and their products may be all important in building up what is needed for dealing with infections.

It is worth remembering that Landsteiner and others after him found it very difficult to get a "good" antiserum against various artificial antigenic determinants. Prolonged immunization was necessary and only 10 or 20% of the rabbits might even then give a satisfactory serum titre. This is precisely what one would expect on an elective mutation plus selection theory of antibody production and just what one would *not* expect on an instructive theory. The responses we presume are developed by a process of mutation and selection from a preformed pattern near enough in some rabbits to allow the process to begin.

CONCLUSION

If we look at the phenomena of immunity from the broadest point of view we recognise something of a dilemma. The findings in regard to tolerance and the very nature of self-recognition in the immunological sense demand an elective interpretation. The multiplicity, flexibility and specificity of the antibody types that can be produced point almost as strongly toward an instructive theory. It seems almost that on a microscopic scale we have here the classical problem of adaptive evolution. How can an organism—or an antibody—emerge exactly fitted to fulfil its function in the appropriate environment unless it is produced under direction by some type of instructive process.

At the evolutionary level the earlier teleological concepts of orthogenesis, elan vital or Shavian "Life-force" and the Lamarckian concept of adaptation by habit and function,

have been discarded completely. Evolution is enormously complex but there is no indication anywhere that more is required than on the one hand mutation and other forms of inheritable change randomly arising and their recombinations in the course of sexual reproduction, and on the other differential survival of those combinations best adapted to the environment. If a self-consistent approach to the phenomena of immunology is desired, it must take the form of an accelerated evolutionary approach that makes use of mutation or its equivalent and selective survival. At the somatic cellular level we have of course a wholly different set of conditions from those operative in evolution amongst organisms and I should like to conclude this lecture with some thoughts on the concept of immune response as a manifestation of evolution amongst semiautonomous somatic cells.

To simplify discussion we shall confine ourselves to the production of antibody and refer simply to antibody-producing cells. It will be implied, however, that when we speak for instance of a cell being stimulated to proliferate and produce antibody, we are concerned with the behaviour of a clone of cells within which there may be functionally different phenotypes and that, in particular, cells of the clone which can give rise to persisting descendants are probably quite distinct from those which actually produce antibody.

With this proviso then we can enumerate the necessary characteristics of those somatic cells which are concerned with antibody production.

(1) The pattern of antibody they produce and of the specific receptors they carry are identical and are determined by a genetically based mechanism.

(2) Once a cell has been committed to the production of a certain type of antibody, any other potentialities are inhibited and from the immunological angle the cell (or clone) can be regarded as producing one specific pattern only.

(3) We can be sure that the production of antibody under genetic control is a complex process that could readily be modified by various types of somatic mutation. If minor changes so produced were common both to the cell receptors and to the antibody liberated and if all proliferation was more active with each improvement in the "fit" between antigen and antibody-receptor, then there would be scope for progressive change in the quality of the antibody with repeated immunization. One aspect of this would be the production of clones of cells specifically fitted to produce antibody specific for much finer differences than could be recognised by primary immunological specificity.

This general concept can be elaborated a little as follows:

(a) In the production of an antibody molecule it seems certain that several lines of genetic information converge toward its synthesis. In addition to the three fractions (two probably essentially similar) of Porter, the carbohydrate component of gamma globulin, the enzymes necessary for the fabrication of the complete molecule, and perhaps genetically defined conditions to modify the form of its tertiary folding, must all be borne in mind.

(b) It would be in line with modern thought on protein synthesis to place chief emphasis on the genetic coding that is concerned with determining the specific pattern of Porter's pieces I and II.

(c) At some part of the genetic specification of antibody structure we must envisage a region of high mutability, analogous to Benzer's hot spots in the phage genome. Following mutation presumably with a certain phenotypic lag of perhaps two to three cell generations, the pattern of receptor and antibody will change correspondingly.

(d) Most mutations are assumed to result in minor changes in pattern but it should be noted that if changes are so large as to remove them from any possibility of reacting with the antigen being considered, the cells automatically cease to have any significance.

The only phenotypic changes of any importance are those which are within the range of pattern with which the antigen or antigens present in the body at the relevant time can react.

With a system of this sort the process of selective survival would depend on the production of more stem cell descendants by mutants better equipped to react with the relevant antigens in the body. Multiplication to give more antibody-producing cells is a secondary matter: what gives advantage is to lay down a population of "memory cells", stem cells which on appropriate stimulation can give clones of antibody-producing descendants.

Here I believe we have an interpretation in terms of which the potentialities and the limitations of the immune response can be expressed to correspond to what is found experimentally. It is a thoroughly biological approach in line both with the development of the general philosophy of biology since Darwin and with modern ideas on the expression of genetic information in the structure of specific proteins.

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Mental Health Everybody's Business[1]

By WILLIAM C. MENNINGER, M.D.[2]

INDEED, it is a very great honor for me to be invited to give this sixteenth Weir Mitchell Oration. Not only does this invitation carry the great prestige of the College of Physicians of Philadelphia, but the additional honor of being associated with the previous illustrious Weir Mitchell orators, going back to the first one, Dr. Charles W. Burr, in 1919.

Under these circumstances, there is the great temptation to recall some of the interesting facts in the life of that amazing man Silas Weir Mitchell. At least for this orator, there has been real excitement in reviewing the life of this physician who contributed so much to our social order with his many contributions in neurology and his justly famous "rest cure", described, incidentally, about ninety years ago. Nearly seventy years ago he described the open ward psychiatric hospital. I shall deny myself the personal pleasure of reviewing his many discoveries, his remarkable knowledge, his unusually broad interests in life—for the reason that these have been previously reviewed in these orations. Furthermore, it is probable that because of his connection with this College and Philadelphia that this audience is familiar with these facts.

Hence to my chosen topic—'Mental Health—Everybody's Business'. For me it is a privilege to attempt to interpret, from the professional point of view, the problems of this field of mental health and mental illness to this audience—an audience I understand to be composed of both physicians and laymen. In doing so, I am grateful for the opportunity because I do feel the problem is so urgent.

It is my conviction that unless a great many more people understand and know what this problem is, the chances are that it will not change. There is a great deal more interest in psychiatry these last few years. One can hardly pick up a magazine but what one finds an article dealing with personality or psychoanalysis or mental hospitals. Many of these articles are excellent. In general, the magazines do a good job of public education. In spite of some poor material, the total effect has helped many more people understand this neglected area of health.

There are each season several Broadway shows that focus in some degree on the personality problem, some of them are quite definitely psychiatric. So often these days the television brings something into our homes about mental illness. Hence, willy-nilly, all of us are getting something of an education about it.

Despite all of this interest, little is really being done in proportion to the size of the problem. Hence my gratitude for this opportunity to talk to you, very specifically, about the extent and the nature of this problem, and what we should be doing about it.

Within the last six months, a group known as The Joint Commission on Mental Illness and Health, supported by a grant of $1,250,000 from the Congress, made a thorough-going survey of the United States in terms of the mental health problems. The Commission was made up of representatives of medicine and the social sciences. Their summary states, in very succinct and unhappy language that: "despite repeated exposure to the shameful, dehumanized condition of the mentally sick who populate the back wards of the hospitals, the public has not yet been aroused to sweeping humanitarian reforms. The mentally ill are lacking in popular appeal. . . members of the medical profession, including psychiatrists, are uninformed and unsympathetic to

[1] S. Weir Mitchell Oration XVI, College of Physicians of Philadelphia, 7 February 1962.

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the vast numbers of untreated in mental institutions." This is a rather damning statement, including my own colleagues in psychiatry, though it was probably justified.

What Do We Mean by Mentally Ill?

Mental illness, from my point of view, includes a far greater range of problems than merely those presented by the patients in our mental institutions. These latter are very important, but they are actually only a small segment of the total picture of maladjustment and mental illness. There is considerable ambiguity in the use of various terms, even among those of us who work in the field of psychiatry. Sometimes we talk about mental illness, emotional illness, maladjustment, many kinds of personality defects, as if synonymous. In addition, there are symptoms of what we refer to as the psychopathology of everyday life, which have also become of interest to psychiatrists.

Even so, none of these terms include many types of problems that one sees so frequently in daily life. There are the tension headaches about which the television educates us. All of us are familiar with marital discord that occurs in so many families among our associates and our friends. We all have private worries connected with business responsibility, parents, children, spouses. Too many of our friends and co-workers depend upon the excessive use of alcohol.

None of these kinds of problems have specific names which identify them as mental illness. Nevertheless, if we make a broad statement that illness is malfunction of some or several parts of a person, these would certainly qualify as symptoms of inability of a person to cope with the demands upon him.

Those individuals who become so mentally ill as to require hospitalization are a major and extremely important segment of our purview in psychiatry. At any one moment, fifty-two per cent of all hospital beds in America are occupied by mentally ill people—a population of 750,000 souls!

In too many of these public mental hospitals, the great majority of patients are badly neglected. Too many of these so-called hospitals are still human warehouses where we have put folks away. Statistically, on the basis of the New York State figures, one out of every twelve of us, at some time during his or her life, will spend some time in a mental institution!

Quite apart from the severe illnesses that take people to the hospitals, there are the fears, anxieties and obsessions which beset a much, much, larger group of individuals. In the Army during World War II, we found that whereas only one of every ten soldiers referred to the psychiatric services of Army hospitals would have gone to a mental hospital in civilian life, nine were unable to report to duty because of emotional problems or behavior difficulties for which they were in need of real help.

For a long time it has been well recognized that a minimum of fifty per cent of all patients who go to a doctor complain of difficulties for which the doctor can find no physical pathology. The emotions can affect any part of one's anatomy—creating symptoms in the gastro-intestinal tract, the blood vessels, or any other system, probably also grossly influencing the course of arthritis and allergies. If the disturbance to some part of our anatomy continues long enough, physical changes do occur, as in peptic ulcer. It has been estimated that seventy per cent of all of the headaches that any of us have are emotional in origin. Probably the figure is higher for the gastro-intestinal upsets that affect all of us. One of the best examples was illustrated by the old adage of the GI during the war—"Oh my aching back!" Probably not five per cent of the backs were organically changed. Nevertheless he did have a backache and certainly was incapacitated. But the emotions had been very much at work in the production of the complaint.

In a recent important survey, it was estimated that 17,500,000 of us in America are in need of professional help because of some personality problem. Of this total number, there are less than 2,000,000 who are receiving

any such help. There are many different kinds of problems. Certainly one of the major ones today is alcoholism. More than five million individuals have difficulty with alcohol sufficient to impair their ability to get along or to carry on a job with efficiency. We can only estimate the extent of drug addiction. We read about it in the paper much more than we hear about it in scientific studies. Each year in America we make a new record in delinquency, yes, and a new record in crime, because many people cannot or will not live according to the rules that the rest of us feel should be our guide lines.

One of the tragedies about delinquency and criminology is that we have, as yet, made such a very limited study of it in terms of what we know about personality. If an individual has a behavior problem that leads him to break a law and is caught, there are two possible results. If he, or his family, has affluence, the probability is that he will be referred for psychiatric help. In my own experience, many such patients respond excellently to good treatment in a pscyhiatric institution, and a great majority get straightened out. On the other hand, if one does not have affluence, the policeman replaces the doctor and he is sent to the penitentiary instead of a hospital. There, only too often, the individual learns new methods of defying the law and so we make the unenviable reputation of having nearly seventy per cent repeaters in our penal institutions.

There are so many problems that have no names or, at best, names that mean little. The fact is, that there are a great many people who do not know how to get along with other people. About seventy-five per cent, and perhaps even higher, of the people in any company who have to be discharged, are released because of social incompetence, not because of technical incompetence. In so many of these situations, there is no attempt made to recognize, to help, those people—other than to discharge them.

There are the famous three A's of industry—alcoholism, accidents, absenteeism. It is reliably estimated that two per cent of the individuals in any company have trouble with alcohol, even if they do not show it conspicuously on the surface, the so-called "silent drinkers". They do not cause enough trouble to call themselves to the attention of their superior. This problem has been referred to in industry as the 'million dollar hangover', because this is the estimated cost to industry of the manpower loss because of alcoholism.

A much larger problem arises from accidents. Accidents are estimated to cost industry and business three billion dollars a year. At least seventy-five per cent of accidents have a major psychological component in their causation. Recently I had the privilege of talking to the president of a large casualty insurance company. He told me something I could hardly believe, but I know that he knows what he is saying. He said that his company pays one million dollars a day indemnity because of accidents to individuals who are injured. To my amazement, this same company does not spend one cent in researching the cause of accidents! We could learn a great deal through research into the psychological component in accidents, but such studies are conspicuously lacking.

The big cost for industry, related to this field, is absenteeism, which the National Association of Manufacturers some years ago estimated as costing 12 billion a year. In so many instances the real cause for the absenteeism is the personality problem that recurs and recurs.

Another way of emphasizing the significance of these emotional problems in industry is what Clarence Randall so brilliantly and succinctly pointed out some years ago: "We spend millions of dollars to try to find the best lubricant to cut down friction in machines; but how much do we spend to find the lubricant to cut down friction among men?" Obviously, the answer is that it is an infinitesimal amount in contrast to the magnitude of the problem.

In the enumeration of the problems, we have not touched on the many facets of our family life, those in students in our educational systems and our law courts where there

are problems. The tensions in life for all of us manifest themselves in one way or another. So often we have regretted the bad judgment we used in this relationship or in that deal. In retrospect we often wonder why we behaved the way we did. We can always see these in our associates. The real problem is to be able to see them in ourselves. Each time we look at the other fellow and see how queer he is, we would be smart to recognize that at times we are a bit difficult too. Our associates, and certainly our wives, will testify to this. This recitation of the extent of the problems of life really has not touched on many others, too—our difficulties in getting along with each other, whether we look at racial, religious, national or international relations.

Mental illness is the number one neglected health problem. When one says that any problem is "number one", he ought to substantiate his statement. My first substantiation is the point that I have been trying to make—the widespread incidence of behavior problems in all of us that, for better or for worse, have something to do with our mental health. Fortunately, most of us don't have to go to a psychiatrist. On the other hand, there are times when all of us are a bit maladjusted, frustrated, angry, inefficient. At such times, one is not at his best. I suspect that there are perhaps as many foxholes in civilian life as there were in military life. If we do anything at all in life that is worthwhile, sooner or later we find ourselves in an in-fighting spot in which we seem to be putting out so much energy and getting so little done. Under those kinds of circumstances it is wise to recognize that our mental health is not so good. Mental health is a matter of degree—shades of grey—and this applies to the illest person in a mental hospital or the most efficient president of a company.

Quite apart from the broad incidence of this problem, there is another factor that is too rarely appreciated, namely, the enormous cost. The major cost of mental illness is the heartache, which cannot be estimated—the heartache that no ones knows about unless they have lived through it. If you have had severe mental illness in your family, you know. If you have not, you may not understand about what I am talking. One feels so helpless when someone near and dear to him becomes seriously mentally ill. How impotent!, how distressed! These experiences are the greatest cost. But we can also figure in dollars and cents some of the cost of mental illness. Just for the hospitalized patients across the country, the sum, all tax money, amounts to the astronomical figure of $1,700,000 a year to run our state and federal mental hospitals. In many of our states, including New York State, it is, next to highways, the largest item in the operating budget. In the State of New York, it is over 200 million dollars a year. Then add to this sum the value of the lost earning power; add to this figure twice the amount spent by patients who go to private sources for help, out-patient treatment in psychiatry, private hospitals, who constitute an amazingly high percentage of the patients.

We do not really know the total financial cost of mental illness—certainly it is well over four billion dollars for those disorders commonly accepted as illness. No matter what we add up, though, we could not include what the efficiency and the mistakes and the worries that our associates, who because of some personality quirk, cost us. This terrific cost is another reason why mental illness is our number one neglected health cause.

Perhaps the cost is related to another reason why mental illness is so neglected, namely, our shortage of manpower. No doubt there are many reasons why we are short of trained personnel to do a better job in psychiatry. Perhaps it is because of the lack of understanding of this field. Psychiatry has not been considered very respectable. The fact that there are many jokes about psychiatry may be another evidence that it is not very well understood. They are probably not unrelated to the lurking fear in the hearts of all of us that maybe there is something wrong with us and that we might need help some time—and this we must deny!

Trained Professional Personnel

In any event, one of our major problems is the shortage of well trained professional people to diagnose and treat psychiatric patients. Psychiatrists are physicians. They have gone through four years of medical school, had their year of internship in a general hospital, and spent three years in what is known as a psychiatric residency training. They may spend two, three or more years beyond this in advanced study in child psychiatry, or in psychoanalytic training. The specialist in any branch of medicine is well along in life when he is ready to open his office for practice. The long and expensive training is perhaps one of the factors that discourages our young people from going into this medical specialty. In any event, of the nearly 180,000 doctors in America there are only about 11,000 physicians in the field of psychiatry. If we were to staff adequately our large mental institutions and our community clinics we ought to have, right now, twice as many of these trained medical specialists as we have—namely, about 20,000. In the entire United States, we are turning out fewer than 1,000 trained psychiatrists in a year. Hence, in our production line, we are ten years behind what we ought to have right now. In addition, we are equally short in those associates who are so essential in our practice, namely, clinical psychologists, psychiatric nurses and social workers.

To indicate more specifically what I mean; in these large mental institutions across America, there is only one doctor for 140 patients. If one figures this out mathematically in terms of the amount of time that a doctor has for each patient, it means less than an hour per month. If the patient were someone you love, maybe your wife, your son or your daughter, you wouldn't call this medical care. So often only custodial help can be provided because there simply are not the trained personnel necessary for treatment.

In terms of our community clinics, which consists of teams of a doctor, psychologist and social worker for every 50,000 people, currently we have only twenty-seven per cent of the number we need across the country. The personnel for the others are not available. From my personal experience, one clinic to every 50,000 people is not adequate to provide the treatment that is needed.

The shortage would be even greater if there were not many other physicians who carry a great deal of the total case load of emotionally distressed patients. In any general hospital, one quarter of the patients, even classified as medical or surgical cases, need psychiatrically-oriented treatment. This is equally true of the practice of all doctors, fifty to seventy per cent of whose patients have psychologically-caused ailments.

Other great sources of help for troubled people, hopefully at least, are those trained in other disciplines—the teachers, the clergy, the lawyers, and many others. These groups are asking those of us in psychiatry what, from our experience, can be helpful to them.

Research

Still another area in which we are so backward in psychiatry is the development of a program of research. We are tragically short of knowledge—knowledge that we can only learn from research. If one adds up the money that is spent in psychiatric research, it is probably a fraction of what is available for cancer. It is wonderful that cancer has such grand support, but so many of us in psychiatry are envious of the support that it receives when we are so short of such greatly needed knowledge.

Currently about fifty-seven per cent of all the research support given to psychiatry comes from the federal government. Would that we had far more private support than we do because many of us have mixed feelings as to what we should expect from the "Great White Father" in terms of our many activities in life. We are nonetheless grateful to have this, though, in light of the shortage of funds and the enormous need for these funds.

Not so long ago I read that we are spending twelve billion dollars a year in America on research—twelve billion dollars doing research

on *things*: aviation, atomic energy, lumber, oil—things. By contrast, even a very generous estimate guessed that we are spending only 150 million dollars on the study of *people*! So often in a company one hears an executive say that his personnel are the most important asset of the company and he is so proud of them. I would want to challenge this executive to name any large company in America where there is any organized study of people, whether it be clients, customers, or their own personnel.

This conspicuous blind spot that we have had leads one to assume that we all think we are amateur psychologists and already understand this very complicated machine—the human being. The fact is, we don't! We must discover so much more about ourselves to help us function better; why we become ill; how we can help people recover more quickly; how we can become more efficient and effective, particularly in getting along with each other; how we can prevent maladjustment!

Public Understanding

Finally, the fifth reason for citing mental health as the most neglected area of health is, in a sense, the antithesis of my presence here. So many people know little, if anything, about mental illness because they have never been faced with its problems.

Severe psychiatric illness often stimulates fear; sometimes repulsion; rarely does it arouse sympathy. Yet so very many families have a "skeleton in the closet" about which its members feel sensitive. Unfortunately, mentally ill patients are too often stigmatized even after they are well. The result of this is, in part, why public financial support ranks seventh or eighth for mental health among the national health drives.

All of these things can be changed. That is why I have presented the darker side of the problem before I tell you a little about the brighter side. Only if people become concerned will they act. We are already making progress. Many more people are interested and many, many more people are helping us.

In those 277 large mental institutions of our country which house 750,000 patients and are too under-staffed to provide treatment, only fifty to sixty per cent of these people will ever return to their communities. It is to one of these places that the "average man" will have to go if he becomes mentally ill because very few of the total number ill can afford private psychiatric care. However, these institutions *can* be made into real hospitals.

To indicate my assurance of this fact, I would like to tell you a personal experience. In 1948 our organization, The Menninger Foundation, after having gone into the major job of beginning to train doctors for the Veterans Administration, was catapulted into doing a similar job in our state institutions of Kansas. Our state institutions ranked 47th out of the 48 states, by most of the criteria that are used to judge hospitals. We had an institution in Topeka that was built for 1500 beds and held 1850 patients. For those 1850 people there were two doctors! It was called a hospital, yes: like another one I visited a year ago, in one of our progressive states, with 6200 patients and three doctors! In the year of our Lord 1960, that institution was called a hospital! The Topeka State "Hospital" was only a hospital in name, it was a snakepit! The *per diem* cost per patient in 1948 was $1.09! It is hardly believable and yet that is the fact. Let me hasten to add, that across America now, unfortunately, we are still only paying $4.50 per patient per day in our mental hospitals. If you have been in a general hospital lately you have not gotten by for $4.50 a day—it costs nearer $30 a day, *not* including physician's care and drugs.

We do not have any magic in psychiatry. We cannot run institutions that are supposed to be hospitals with the kind of staffing pattern we have and with the kind of money that is available to run them.

In our situation in Kansas, we had some unnecessary, tragic accidents—they were comparatively unimportant. The Press surveyed the *whole* situation that existed in our state institutions. In this large hospital in our city,

probably eighty per cent of the people who entered it never left alive. There was such a clamor across the state, from various groups of people—civic clubs, women's clubs, business groups—that our Governor was led to act, as was our legislature.

After the usual investigations they came to us, knowing that we were training doctors for the Veterans Administration. In essence, they said to us, "If you can do this job for the federal government, why can't you do it for your own state?" The fact is, we had taken on an assignment to train doctors, four times as many as we thought we could, in our initial planning. On the other hand, we could not say no to this request from the state of Kansas. We are glad of it now because for the last seven or eight years, Kansas has been the number one state in the union, by most of the criteria for judging mental hospitals.

Where we had 1850 patients, today there are only 950. I think the Topeka State Hospital is probably the only mental hospital in the world where they are closing wards—five of them—because we do not need them. At the same time, the admissions have nearly quintupled, because in Kansas now it is respectable to go for psychiatric help. People no longer enter our mental hospitals expecting to die, or never expecting to see their relatives again as they used to do. An individual can go, justifiably, with hope in his heart. It is common knowledge that a great majority of these folks get well—eighty-six per cent went home last year. Furthermore, seventy per cent of these went within a matter of ninety days. We have doctors, psychologists, social workers and nurses there now who provide treatment.

In our Kansas state hospitals we now have a ratio of one doctor to every thirty-nine patients. This is in such very marked contrast to the figure for the national picture of one doctor to 135 patients. So many of our so-called mental hospitals across America are still a disgrace to all of us. Unless enough of us care to see them changed, they will not be changed. On the other hand, if enough of us *do* care, they can *all* change.

Our legislatures across America, our Governors and our populace, are much more interested in seeing these institutions become hospitals than they have been. Perhaps as I said earlier, it is because it has become big business—because of the enormous costs. Also because of the increased public interest. It has been my very special privilege now to be invited and to have appeared before the combined legislatures in twenty of our states, and tomorrow I am privileged to address the Maryland Legislature. Hopefully, more and more of these miserable, forgotten, sick people will have a chance to get well if the legislators *and* their constituents, become sufficiently interested to put up the money—to train the people, to do the research and to really make these institutions into hospitals.

It is a great sign of progress for the mentally ill that at the annual meeting of the Governors' Conference in Honolulu last June, one of the morning sessions was spent discussing the problems of mental illness and the state hospitals. The Governors were sufficiently aware of the problem to organize a two day conference in Chicago three months ago, to spend the entire two days considering the problems in their mental hospitals and what could be done to improve the treatment methods.

There are many other ways in which we are making progress. Gradually there are more doctors going into this field. Much more training is going on than ever before. While I presented a gloomy picture about the extent of the research, we are greatly encouraged with the increasing support from many, many sources for research in mental illness. We are delighted that research is also going on in mental health in our school systems, our family life, our business life.

Even though we are raising more public financial support in this field of mental illness, we cannot go on being seventh and eighth in the health causes and really make much of a dent, in terms of progress. It costs money to train people, it costs money to do research, it costs money to set up community clinics. It

costs money to do something about delinquency and crime if we are going to study them scientifically. Community mental health and such problems as alcoholism, absenteeism, accidents—all of these need more research. We are so encouraged with the increasing number of people who are becoming interested in this need.

In addition to accepting this delightful honor of being the Silas Weir Mitchell Orator for 1962, I sincerely hope that many of you will have learned some new facts about the neglected field of mental illness. Hopefully, my remarks may lead you to the conclusion that 'Mental Health is Everybody's Business'. Everyone can help solve these neglected problems. If enough of us are sufficiently motivated, the mental hospitals of this state—yes, every state, could be made to measure up to the ideal that Weir Mitchell described in his famous Address to the American Medico-Psychological Association in 1894. If enough of us cared, the situation could change, not only in terms of our state institutions but in our community life, in our family life. Any change must start in the personal life of each of us as individuals. My sincere hope is that it will start in yours!

Laboratory Medicine in Russia[1]

By JOE M. BLUMBERG, COLONEL, MC, USA[2]

UNDER a U.S.A.-U.S.S.R. scientific exchange, I left Washington for Moscow as one member of a team of three exchange pathologists to visit medical schools and institutions in order that we might exchange ideas and learn of education and research.

Our itinerary was to be negotiated on our arrival through the Ministry of Health, which had arranged for us to meet with Professor A. I. Strukov, Chairman of the Department of Pathology at the First Moscow Medical Institute. Professor Strukov, who had visited the United States, was the fifth professor to hold the Chair of that Department since it was instituted 155 years ago. He is also a corresponding member of the Academy of Medical Sciences. Dr. Strukov proceeded to indoctrinate us in the medical organization of the U.S.S.R., at the same time planning our itinerary so that we could see the most important people and institutions.

Appointed from the Supreme Soviet Council of the U.S.S.R. are ministers who represent each branch of their government. This council of ministers, of whom the chairman is Premier, consists of about 50 members. One of these ministers, the Minister of Health, has direct responsibility for the overall health program of the U.S.S.R., which is organized to cover many fields and is also responsible for health programs in the other ministries. This broad responsibility includes the Sanitation of Food Industries, the Armed Forces Medical Administration, the Sanitary Services of the Ministry of the Navy, the Health Services of State Security, and Sanitary Services of the Ministry of Internal Affairs.

The Ministry of Health has a health authority as well as a political authority which extends in the pyramidal system from the Union into the Republic, Oblast, Rayon, and Uchastok.

Several years ago the Academy of Medical Sciences was formed under the Ministry of Health, and all medical and health activities were removed from the Academy of Sciences, which comes directly under the Council of Ministers. The Minister of Health has his Academy of Medical Sciences to give him technical advice. This is broken down into the treatment and preventive services, which amount to 67 per cent of his activities; child care—13 per cent; hygiene—5 per cent; medical education and research—9 per cent; and administration, medical industries, construction, equipment and drugs—6 per cent.

Under the Minister of Health, the mission of the Academy of Medical Sciences is to improve scientific and medical equipment in research institutes, increase and train scientific personnel, and carry out the wishes of the Communist Party Congress. This mission is carried out through basic research in medical and biologic sciences, chemical sciences, and hygienic sciences. The Academy has a Praesidium composed of a President and three deputies, two Members-at-Large, and a Secretary—all of whom are elected for 3 years. It receives a budget on a 5- to 7-year plan and has an active membership of 100 members, with 125 corresponding members.

When a physician graduates from medical school after having had 10 years of general education and 6 years in a medical institute, he is usually about 22 years of age. Approximately 95 per cent of these graduates enter into practice in an assigned part of the Union. The other 5 per cent, who have excelled in their studies and political beliefs, are accepted

[1] Thomas Dent Mütter Lecture LXXIV, College of Physicians of Philadelphia, 6 December 1961.

[2] Deputy Director, Armed Forces Institute of Pathology, Washington, D. C.

into graduate work either as an ordinator, junior assistant, or chief of a section in an institute. Approximately one-half of these have completed their education after 3 years and are assigned to posts in the Union to carry out their medical duties. The other half may continue to work in one of their institutes or hospitals, where after about 10 years they will be eligible for consideration as a candidate for medical science. In another 10 years they may present their work for their thesis and receive their doctor of medical science degree. By this time they are usually 45 or 50 years of age, but may attain this degree earlier if it is warranted. Those who receive their doctor of medical science degree are eligible for professorships in medical schools and to head departments in the leading research institutes. It is from this group that they may become elected as corresponding members of the Academy of Medical Sciences, and later as active members.

Professor Strukov stated that in his department there are 30 collaborators, 8 assistants, and 3 docents, who teach 600 students in the Third Course and 600 in the Sixth Course. In the Third Course they receive instruction in pathologic anatomy for 5 hours a week for 1 year, and in the Sixth Course receive 6 hours per day for 6 days a week for a year, the work including general and surgical pathology. Their teaching material is derived from approximately 600 autopsies and 4,000 biopsies performed yearly. They train around 75 physicians in postgraduate work in pathology. They also have two to three students from each medical school who study in this Medical Institute, spend about 2 years in practice, and then return to get their special training in pathology. Many of the graduate students are there for research training. From various charts Professor Strukov illustrated 40 years of work in pathology under the Communist regime from 1917 to 1957.

In each of the Republics, the Academy of Medical Sciences has a Chairman of Pathology who is connected with a medical school. In the Ukraine alone there are 12 medical schools, and there are many others throughout the various Republics.

Next we visited the Institute of Clinical and Experimental Oncology, one of their leading cancer research institutes. Associated with, and a part of this Institute, was a hospital where patients were brought, as they stated to us, not for experimentation, but for new methods and treatments that had proved to be effective. Professor N. N. Blokhin, Director of this Institute, at that time was a corresponding member of the Academy of Medical Sciences. Later he became an active member and shortly thereafter was elected President of the Academy of Medical Sciences. His Institute has a staff of about 100 people who perform research in biology, morphology, chemotherapy, tumor strains, tissue culture, chemical synthesis, immunology, hormones, hormone therapy, experimental biotherapy, histochemistry, x-ray, the etiology of cancer, and its relation to clinical research. One member of our exchange group has been working, on an exchange basis, in this particular Institute for about 6 months.

In our general briefing by the Director and his staff, we learned that much of their work deals with cell cultures from carcinoma of the pancreas and stomach, mixed tumors of salivary glands, carcinoma of the breast and ovary, and from angiosarcoma. They commented that industrial and environmental dangers were being investigated, particularly with regard to asphalt, soft coal, water pollution, and smoked foods in the cause of cancer. As a result of some of their studies and as part of their air-pollution study program they had already stopped the manufacture of beta-naphthylamine and other benzine derivatives. Their histochemistry studies were directed largely to oxidizing and reducing enzymes, mostly by methods from the United States—none of their techniques being original with the U.S.S.R. It was pointed out that of all of the cancers in the Soviet Union, approximately one-third were carcinomas of the stomach. On all autopsies performed from several large institutions, 9 per cent of deaths were due to

cancer. Lung and esophageal cancer accounted for 12 to 15 per cent of their cancer deaths. They explained that they have three theories on the cause of cancer: One, the polyetiologic theory advocated by their Director, holds that cancer is due to everything; that is, it arises in burn scars, from x-rayed or sun-tanned skin, heat, and numerous other agents. They felt that it was an excellent theory for the clinician, epidemiologist, and people interested in prophylaxis.

In the second theory, which was advocated by their Chief of Pathology, cancer is considered to be of a biochemical nature—that it is due to a variety of chemical and physical carcinogens that alter the biochemical reaction of cells. Through this there is cellular proliferation of tumors that may be related to a host of biochemical trophic substances, which in most cases is undemonstrated. Chemical carcinogens are active in healthy and sick animals alike. Tumors arise slowly and are preceded in many cases by precancerous changes. The growth of tumors can be affected by a variety of biochemical agents, and malignant tumors change during the course of the disease, becoming more malignant as alterations occur in the nervous and endocrine systems.

The third theory, that of viral origin, is advocated by Tmofeesky and Zilber and is strengthened by the fact that Rous' sarcoma is caused by a virus demonstrable by tissue culture; that tissue cultures and fibroblasts undergo malignant transformation with the appearance in the malignant cells of virus-like particles; that virus-like particles are seen in many tumors by the electron microscope; that specific antigens have been demonstrated in some tumors; and that the chemistry and physics of the nucleoproteins in which the malignant changes seem to be primary are very similar to the chemistry and physics of viruses.

At present the polyetiologic theory is most popular. All of the theories, and particularly the last two, permit the performance of infinite experiments and are sophisticated in terms of scientific complexity.

At this Institute the scientists work a 35-hour week and the technicians a 41-hour week.

Workers in the Laboratory of Virology stated that results of studies on vaccines prepared from tumor tissues were not encouraging. Sarcolysin, developed and used in this Institute, was useful in a few groups of tumors. The chemotherapy causes regression, but rarely cures. They use combinations of surgery, chemotherapy, and radiotherapy in advanced cancer. The cheek pouch of hamsters is used in cultivating human tumors and in producing new strains which they may use in animals. They have found the ground squirrel to be susceptible to mouse tumors. We were shown an angiosarcoma cultured for 4 years from a stomach cancer. Skin of the human embryo and human melanoma have also been cultured in this laboratory.

In the Laboratory of Experimental Biotherapy they were investigating the use of antibiotics in cancer, most of the work being done on mouse cancer, but with little success.

In the Laboratory of Experimental Chemotherapy they started using nitrogen mustard, but since the results were disappointing they tried other chemicals. Alkylating metabolites were found more potent than nitrogen mustard. Sarcolysin, for example, was found to be quite effective in some solid tumors such as seminoma and multiple myeloma. More complex alkylating agents, such as peptides of sarcolysin, give better results with milder side effects.

In the Laboratory of Experimental Hormone Therapy they were trying out the effects of various hormones on tumors in both animals and humans. They found that androgens cause regression in 80 per cent of their human breast cancers. Ovariectomies were also performed in cases of female breast cancer. Male breast cancer cases were treated by hypophysectomies. When we visited the Cancer Clinic we saw patients who had recently had rather advanced cancer of the stomach and ovary who were receiving sarcolysin as well as 5 per cent alcohol in a glucose-saline drip. The patients appeared comfortable and were talking 24

hours after operation. Frozen sections are done routinely on their cancer cases.

We later visited the Laboratory of Organ Transplantation in the Moscow Medical Institute and saw large dogs that had been grafted on the chest with the head and shoulders of a small dog. One such graft appeared in good condition, and both dogs were active. The aorta of the small dog had been anastomosed to the right carotid of the larger dog, and the vena cava to the subclavian vein. The grafted head was very alert, and active Pavlov and pain reflexes were evident. When the ear of the large dog was pinched, the small dog snapped; when the large dog drank, the small dog made lapping motions. These transplants usually survive 20 to 22 days. The tissue immunity produced necrosis of the graft, and they are carrying out rather extensive investigations on this.

Next we visited the Emergency Hospital, one of their large hospitals for first-aid care and treatment. The main building is an old church, no longer used in that capacity. There are 250 doctors on the staff, 500 nurses, and about 750 other attendants for the 1,030 beds, of which 750 are for surgical cases. Each Chief Surgeon does from 15 to 25 operations per day, and the work day may extend over a rather long period. The Director and his staff conduct a daily clinic for the purpose of reviewing cases admitted the previous day. The cases are presented by the physicians who attended the patient. At the early morning conference we attended, the cases were discussed quite frankly and freely, with critical comments when indicated. It was in this hospital that cadaver blood was first used and is still being used for transfusions. This practice was started about 1932 by Professor Yudin. To date they have used some 60,000 pounds, or 30 million cc. of blood, without a single transfusion death. Usually 2 to 3 liters of blood are obtained from each cadaver by placing catheters into the carotids and aorta. Only those bodies that show no chronic disease or infectious process are used. The blood is obtained within 6 hours of death. An autopsy is performed, the blood is cultured, and no anticoagulant is required. The blood is kept for a period of about 5 weeks at 4 to 5° C., with small amounts of streptomycin added. In this hospital this blood is used in 80 per cent of all transfusions, while in 20 per cent the blood comes from volunteer donors. Regarding the use of blood substitutes, we were told that polyglucin (dextran) was used generally, but BK 8 is used in some areas, especially Kiev, where it is manufactured. They considered blood superior to BK 8. In Russia the law is such that an autopsy may be performed on death cases, so this makes the use of cadaver blood feasible, as well as providing an abundance of pathologic material for study. In this hospital they perform 3,000 autopsies a year. Each body, including the central nervous system, receives a complete autopsy. The principal causes of death in this hospital are (1) malignant tumors, (2) cardiovascular disease, (3) gastrointestinal disorders, and (4) street accidents.

At the Institute of Experimental Biology we were told they were engaged in three general areas of research; namely, regeneration (including cell division); heredity (particularly human heredity); and malignant growth. The individual laboratories included areas where work was performed in the biology of antigens; the chemistry of immunity; cytology; growth and development; histophysiology; immunity in embryogenesis; and noninfectious immunity. Of major interest was the study of the laws of cell division. The problem of tissue incompatibility in connection with tissue or organ grafts was a second major interest. A study of various species and strains of animals and microorganisms was a third major interest, including a search for a model of hereditary diseases. In general, the laboratory studies are supplemented by the clinical work, and all of the research is directed toward solving clinical problems. In the Laboratory of Immunobiology they were studying the problem of homotransplants with skin. It was found that these skin transplants grow in 50 per cent of the cases; they do produce antibodies in the

host, however. Small grafts succeed in a higher percentage of cases. In the study of the rejection process, the blood vessels have proved very important, and large body grafts may survive as long as 6 months. We saw a study of blood vessels and environment in embryonated eggs, illustrating the regeneration of various organs in the chick. They were also studying regeneration of the liver, spleen, kidney, testis, and ovary in monkeys.

At the Institute of Normal and Pathological Physiology there were 21 laboratories, with 305 people working in them. The principal problems under investigation were the physiology and pathology of the circulatory system, the physiology and pathology of the nervous system, and oncology in general. They were studying the relationship between tumors and the host, with particular reference to the innervation of tumors. The effect of conditioned reflexes on cancerogenesis was being investigated. Changes in the nervous system are produced by these reflexes, which precede the appearance of tumors by 3 to 4 months. The results appear to demonstrate that unless there is a decrease of conditioned reflexes the tumor does not grow. Likewise, recurrences of the tumors after excision are noted in conjunction with depressed conditioned reflexes. No specific resistance has been found against tumor growth.

In the Laboratory of Anatomical Physiology they were studying the function and morphology of bones, muscles, joints, fascia, serous membranes, and lymphatics. Many of their studies had particular emphasis on lymphatics; for example, in a carcinoma of the stomach the lymphatics of the tumor are dilated and are able to absorb proteins directly, in contrast to the blood capillaries, which are unable to absorb them. In the lung it is found that there are lymphatics supplying the terminal bronchioles, but no lymphatics between the alveoli.

In the city of Sukhumi, in the Republic of Georgia, we visited the Institute of Experimental Pathology and Oncology. The Director, Professor V. A. Lapin, is a member of the Academy of Medical Sciences. During World War II he was a pilot and lost one of his legs. He is very knowledgeable, and although he directs the Institute with a firm hand, he is well liked by all those associated with him. It is here that they have a large primate colony located on 26 acres of land, with a number of open-air cages, as well as buildings and laboratories. They have 1,300 monkeys, handled by 82 workers who feed them on a diet consisting largely of bread, greens, and sunflower seeds obtained from nearby farms. They are fed four times daily, and their diet is supplemented by salt, bone meal, and apples. They expect to have 3,000 monkeys within the next 5 years, and since the Institute was started about 35 years ago, they have received 4,700 primates of 12 varieties. The largest number are the baboons and rhesus monkeys.

A variety of work is carried out here, as scientists from all over the Soviet Union come to this location to carry out studies that involve primates.

Professor Lapin told us that they do their hemoglobin studies with Sahli tubes, that they test out new antibiotics, and that most of the dysentery is a Flexner strain. They see very little amebiasis in the monkeys.

Some of their people over the years have become experts in obstetrics and gynecology involving the colony. Most of the pregnancies are without complication, but about 10 to 15 per cent of their pregnancy cases have abortions, associated usually with hypertension, eclampsia, and fatty liver. Other complications that have been seen have usually been rupture of the uterus or ectopic pregnancies. They have no carcinoma of the cervix, and those who have had high doses of progesterone have died of carcinoma of the ovary. Only those under active experimentation are kept in inside cages.

One of the studies consisted of the production of neurosis and its effect on internal organs. Hypertension and myocardial infarcts in neurotic baboons can be produced by changing day and night living; taking a male's beloved female and placing her in another cage nearby with another male; by clanging a loud bell every hour day and night for months; or

by shocking the animals while feeding. A high order of emotional stress is required to produce an experimental neurosis. They studied the effects of these induced neuroses on coronary disease and arteriosclerosis.

In addition to the primates, they use many mice and rats as experimental animals. In another area they were studying prophylaxis against injury from irradiation and were also trying out many different chemicals as protective measures against the effect of x-rays. Most of these chemicals contain sulphur and are neurotropic substances. At that time a new treatment introduced for radiation sickness consisted of acetycholine and adrenalin. With this combination of drugs, 40 per cent of the treated animals survived. They were also studying pathogenesis of irradiation effects and the changes in the various organs, both grossly and microscopically. Whole-body irradiation produced the most marked changes, but individual organs were successfully screened out during the whole-body exposure. For example, they had studied some animals whose testes were screened, and no secondary effects were found from whole-body irradiation. Larger doses of irradiation were required when applied to the brain. They were using radioactive cobalt 90 as a source for all their experimental work. They do not know what comprises a lethal dose of radiation. Some animals that have received 350 r. have become sick and died, while others that received 700 r. have remained healthy and survived. They have produced carcinomas by the use of radioactive silver needles placed in the cheek. As a rule, spontaneous malignancy in primates is rare. There has been only one case of carcinoma of the breast since the establishment of the colony.

Other work has been directed toward the study of cirrhosis of the liver. They have produced the disease, resected the liver, and had the liver regenerate with normally functioning liver cells on a good diet. Following this work there have been three such operations carried out in China and one in the Soviet Union, which they claim show promising results.

At one time malaria was being studied at this Institute, but since it was stated that only 400 cases of malaria occurred in the previous year in the U.S.S.R., this is assuming less importance. Since there is a lot of echinococcosis in Siberia, much emphasis is being placed on experiments with this disease. Emphasis is also given the study of rheumatic and rheumatoid diseases, since these are rather prominent in patients, particularly in the city of Novosibersk, a city of 700,000 that is rapidly growing.

Although there is good communication through conferences with the various departments, only the Director knows all about everything going on in the Institute. Of particular interest to us was the Director's explanation of how research and scientific studies are handled at the Institute. The Institute is operated with the help of a scientific council consisting of the chiefs of the various laboratories, nine in all. These chiefs of laboratories were selected by secret ballot after a list of candidates had been obtained through advertising.

In Kiev we visited the Institute of Physiology, where work was being carried on in four areas: (1) the development of the nervous system and its activities, (2) the connection of the nervous system with the viscera, (3) compensation and defensive functions of the nervous system, and (4) biophysics and radiobiology. This Institute had 13 departments and laboratories. Some of their studies concerned the findings on peripheral nerves associated with cancer and the problem of infectious diseases—both bacterial and viral—as they affect the central nervous system. They were also studying cellular changes produced by more severe and longer application of irradiation. In this field they were using fluorescent-antibody techniques. It had been determined that the staining in viral diseases was due to DNA and not to the virus proper.

In the Laboratory of Clinical and Experi-

mental Pathology of the Nervous System they were also working with the poliomyelitis vaccine and were familiar with the controversy related to the Salk killed-virus vaccine versus the Sabin live-virus vaccine. They were more favorably impressed with Dr. Sabin's vaccine; he had visited this laboratory.

Our next visit in Kiev was to the Medical Institute, where the main studies were on poliomyelitis, influenza, and hepatitis, with the greatest emphasis being placed on influenza. There were 40 clinical beds available for patients with this disease; 40 beds for polio cases, and 25 for viral hepatitis. These studies were carried out by a combination of morphologists and virologists. In addition to their diagnostic laboratories, they also had experimental laboratories in poliomyelitis, influenza, viral hepatitis, biochemistry, radiobiology, and instrumentation. They had no satisfactory diagnostic test for viral hepatitis. They stated that the disease was rare in the Ukraine; nevertheless, they screen out their blood donors carefully, and attempts have been made to sterilize whole blood and plasma with ultraviolet irradiation. In the Hepatitis Laboratory they were using a test that depended upon the adsorption of the virus on bacteria followed by agglutination. Another test they were using consisted of an injection of serum from a hepatitis patient into the anterior chamber of the rabbit eye, producing an inflammatory reaction. The addition of viral hepatitis convalescent plasma neutralized the inflammatory ingredients in the plasma of the acute viral hepatitis case so that it no longer produced inflammation in the rabbit eye. They were also carrying out studies with the Coxsackie viruses. The laboratories appeared to be complete, well equipped, and to have trained personnel in abundance.

In Leningrad at the Institute of Experimental Medicine we met the Chief of Pathology, Professor Anichkov. He had three separate laboratories where investigations were being carried out on the pathology of blood vessels and arteriosclerosis, infectious diseases, and the role of the central nervous system in various diseases and pathologic processes. He was carrying out his investigations on arteriosclerosis by feeding cholesterol to rabbits. These studies were largely anatomic. He believed from his experience with soldiers during the war that the effect of stress in the production of arteriosclerosis was not important. He feels that coronary occlusion is due to definite lesions in the vessels rather than to constriction and that these lesions may be found if a careful search is made.

Following this we visited the Military Medical Academy in Leningrad, which is a medical school with some 44 departments. The students who attend this military medical academy are very carefully selected from the third year of medical study in the various medical schools throughout the U.S.S.R. Although women physicians served with the military forces in the last war, only men are considered now, and these are usually the top men in each medical school from which they are selected. A great deal of training is given in subjects that pertain to trauma. They spend a year and a half in anatomy after coming to the Military Medical Academy. They had many teaching specimens of all types, and in one room there were some 8,000 skulls alone to be studied. We were shown a teaching museum. In the dissecting rooms the students were actively at work, with about 20 students to one body. They commented that cadavers were in short supply.

Back in Moscow we visited the Institute of Virology. Here many virus diseases are studied, especially those of the respiratory tract and the neurotropic viruses. There were a number of supporting laboratories studying the general virus problem, such as the Laboratory of Biochemistry, Laboratory of Encephalitides, the Laboratories of Hepatitis, Measles, Virology of Tumors, Rabies, and others. They pointed out that they had isolated the virus of Russian spring-summer encephalitis and had been able to produce an effective vaccine on sheep embryo kidney tissue cultures. They claim

that the vaccine prepared from these kidney tissue cultures is effective against both the Russian spring-summer and the Japanese encephalitis. In the Laboratory of Hepatitis we were told that they had been able to cultivate a virus believed to be that causing infectious hepatitis. This was cultured on human embryonic liver tissue. With this medium they had been able to keep the virus growing through 15 passages and were preparing to make a virus vaccine from this material. They had not been able to reproduce the disease when they attempted it. By using angiosarcoma cells of a certain strain, they were able to cultivate several types of neurotropic viruses that showed the cytogenic effects. They also discussed the oncolytic effect of different viruses on tumors, but so far nothing particularly encouraging had been found. The laboratories in this Institute were rather active and well equipped with modern apparatus and well-trained personnel.

On our visit to the Central Institute of Hematology and Blood Transfusion in Moscow we were told that they were doing a large amount of work in plasma fractionation. They were also working on an antiburn serum obtained from patients who had suffered severe burns. This was being used with some success on fresh cases. The exact mechanism of this potentially important work was being studied in dogs. They were concerned with transfusion problems regarding blood dyscrasias, various anemias, and the conservation and preservation of blood. Their only attempt at preservation was the addition of 5 per cent alcohol in glucose. They felt that this preserved blood in good condition for 30 to 40 days. As a blood substitute they were using a polyglucin with a molecular weight of 80,000. They found they were able to use from 2 to 3 liters of this material per day without producing a bleeding tendency.

It has been a pleasure for me to present this Mütter Lecture before the College of Physicians of Philadelphia, and I hope that it has included some timely information pertaining to surgical pathology.

A Summer Fellowship in Liberia[1]

By EUGENE L. KLENK, M.D.[2]

"MAY I have your attention please. We shall be landing at Robert's Field, Liberia, in a few minutes. Would you kindly refrain from smoking and fasten your seat belts. Your hostess is now passing out chloroquine tablets and we strongly suggest that those passengers not already taking malarial prophylaxis begin with this dosage."

With these words, my wife and I knew we had arrived in Africa, South of the Sahara, at last in the Tropics. In an incredible 11 hours we had journeyed from New York City to Liberia, over 4,000 miles, and we were ready to embark on our summer adventure.

LAND OF CONTRASTS

It has often been said that Africa is a continent of contrasts. Liberia certainly proves this statement. The airport, located about 25 miles from Monrovia, the capital of Liberia, was built during World War II by the United States Government so that the Allies would have a base on the "bulge of Africa." Here we encountered typical-looking businessmen, no doubt employed by European and American companies in West Africa, on one extreme, Mandingo people in long, flowing robes traveling to other parts of Africa on various business ventures, and, on the other extreme, natives dressed in their finery climbing into an airplane for the first flight of their lives.

In Liberia one sees every evidence of opulence among the governing élite, long black limousines, many servants, farms in the hinterland, and, at the same time, the minimum wage for unskilled labor may be lower than $1.00 per day

Besides contrasts in the mode of living, many contrasts in the landscape and climate exist. The coastal area in the Monrovia region is flat and fairly monotonous. The humidity is high and temperature always hot. About 60 miles up the coast, the small city of Cape Mount is surrounded by lovely hills and much variety in plant and animal life. In the evenings people even light fires and often use blankets part of the year. Near the Guinean border in the Nimba mountain range where huge, rich iron ore deposits are being mined by a Swedish/American/Liberian company (Lamco), the mountains are so tall that one can see for miles and the evenings are quite chilly because of the high altitudes. Such diverse countryside and climate in a country only 42,000 to 43,000 square miles partially explains the individuality of Liberia's many tribes, the Vai, Kru, and Loma, to mention just a few.

ECONOMIC DEVELOPMENT

Quite erroneously we had believed that Liberia was virtually an American outpost in West Africa and consequently had assumed that her resources were fairly well developed. How incorrect this view was, we only slowly learned. Even though many large companies, such as Firestone and Raymond Concrete, have extensive interests in Liberia, there is still much to be developed and hopefully some of the control will be vested in the Liberian government and in Liberian businessmen so that some of the financial profits of development will be lodged in Liberia. Recently a contract to build a hydro-electric plant has been signed, and a railroad is currently being built to exploit the iron ore deposits at Nimba. Until 5 years ago

[1] William Harvey Perkins Prize Essay III, Section on Public Health, Preventive and Industrial Medicine, College of Physicians of Philadelphia, 1961.

[2] This study was done during the summer of 1961 through a medical student foreign fellowship granted by Smith Kline & French Laboratories of Philadelphia. Dr. Klenk, then a fourth year student at Temple University School of Medicine, is now interning at the Massachusetts General Hospital, Boston 14, Massachusetts.

few roads existed and even now although the major interior cities and villages are connected by roads, many coastal cities, such as Cape Mount and Cape Palmas, may only be reached by foot, water or air. It has only been in the last 5 years that the government has devoted any serious consideration and sizable funds to the education and health of its citizens. Also, the development of agriculture is of primary importance if the economy is ever to be self sufficient and free from reliance on world prices of primary products, such as rubber and iron ore. However, there is much activity of development in Liberia now and President Tubman's government is receptive to assistance and new ideas for building Liberia's future.

FIRST GLIMPSES OF MONROVIA

Monrovia is a most remarkable city. The poverty and slums defy one's imagination; at the same time the residential areas outside the city are lovely. A luxury hotel overlooks the harbor and city that could easily be located on the Florida Gold Coast. Currently many millions are being spent to construct a new executive mansion for President and Mrs. Tubman. Also many new government buildings are being constructed. However, only small sums in comparison are being spent on welfare activities, such as public health and education.

MEDICAL CONDITIONS

A report of the famous Harvard African Expedition to Liberia (1) in 1927 states, "There is among the Liberian people no health organization of any sort anywhere in the country, no public health laboratory of any description and no adequately trained sanitarian or physician." Since that time the public health program in Liberia has expanded considerably, but is still sadly deficient. At the present time the public health service with the assistance of the United States Overseas Mission (USOM) still often referred to as the ICA, maintains scattered clinics throughout Liberia and 23 qualified physicians. Of this number, the majority are foreign, because Liberia has only 7 trained physicians of her own. For a population of roughly 1 million, it is readily apparent how sparsely the medical personnel are distributed. In addition to the government effort, missionary clinics and hospitals run by almost every religious denomination are found throughout Liberia. At the present time a large part of the burden of medical treatment in Liberia is carried by these missions. We were luckily able to spend the summer participating in both the missionary medical program and the Liberian Public Health Service so that we were able to gain an extremely comprehensive view of the total medical effort in Liberia.

CUTTINGTON COLLEGE AND DIVINITY SCHOOL

After spending several days in Monrovia securing residence permits, meeting both Americans and Liberians, and generally becoming acclimatized to the slow pace of tropical living, we drove interior to the "hinterland", our destination. Through the kind assistance of Bravid Harris, Protestant Episcopal Bishop of Liberia, my wife and I were invited to assist in the Agape Medical Center, the Clinic at Cuttington College. Suakoko is located about 128 miles directly interior from Monrovia. Here the Episcopal Church sponsors Cuttington College and Divinity School, a small liberal arts college with a total faculty of 25 composed of Europeans, Liberians, Indians, and, predominantly, of Americans. There are approximately 140 students drawn largely from the West and East coasts of Africa. One student even came from Panama.

AGAPE MEDICAL CENTER

The clinic was set up in 1958 by Dr. John F.S. Stewart, a minister as well as a board certified surgeon. It is housed in a 3-room concrete building and treats up to 150 patients per day. The staff consisted of one excellent registered nurse, who was trained at the University of Toronto and acted as Dean of Women at the College when not at the clinic; two native dressers who bandaged wounds, removed sutures, gave intramuscular injections and acted as interpreters; three

native boys whose duties were mainly in keeping clinic records in order and organizing the patients on clinic days; and two more native boys who acted mainly as interpreters for the nurse and myself. Everyone pitched in when clean-up time arrived. There were no surgical facilities other than for minor procedures.

The laboratory facilities were rudimentary, consisting of equipment to do fresh urine and stool examinations and Sahli hemoglobin determinations along with chemical tape to test for protein and sugar in the urine. The drug supply, although not overwhelming, was adequate. Much of it consisted of samples gathered in the United States and Canada and sent to Liberia by physician friends of Dr. Stewart. The bulk of the antibiotics, antimalarial and antihelminthic supplies were purchased in Monrovia.

GBARGNA CLINIC

Because the doctor who runs the Agape Clinic was on leave of absence, I was given the opportunity of working under an Italian doctor for the Liberian Public Health Service in nearby Gbargna for 3 days of each week. In Gbargna district, which encompasses Cuttington College, the Liberian government is running a pilot project in rural development and the Charles B. Dunbar Memorial Clinic is one of its main components. The clinic is relatively well staffed, having one registered nurse, four medical technicians, and two registered midwives, together with assorted ancillary personnel. Dr. Guilio Damiani, the physician in charge, was a veteran of five years in Liberia. This experience coupled with his formal training in tropical medicine on the Continent and command of English, made him an ideal consultant and teacher for a program such as mine. On the days that I was present at his clinic, we would examine patients together, go over some of their laboratory work and then spend the late afternoon discussing various aspects of tropical medicine. These were very enjoyable and rewarding days.

In addition to the main clinic, there are 7 satellite clinics and a leper colony which are administered by the Liberian Public Health Service under this doctor's care. In the near future these facilities will be enlarged to include an 18 bed hospital and operating facilities as the USOM working with the Liberian government has recently assigned an American physician to assist in the project.

The facilities of this clinic sound better on paper, however, than in reality. While I was here none of the satellite clinics had any drugs, the power plant at the main clinic was broken, the doctor was without transportation so that he was unable to supervise the satellite clinics. At one time in his clinic he had no adhesive tape, antimalarial drugs or antibiotics. The choice of drugs here in general was sorely limited even when "completely stocked." All of which could be directly attributed to the needless red tape involved in the ordering and paying of bills by the Public Health Service. The government in Liberia is famous for its delinquency in paying bills. However, in Liberia one is always hopeful that such difficulties will soon be worked out.

DISEASES TREATED

At these clinics I was able to see and participate in the treatment of a vast number of diseases. A fascinating aspect of practicing medicine in the tropics is that one sees all the diseases present in the more temperate climates as well as the tropical entities. I was quite surprized at the incidence of rheumatic heart disease in this area and had several patients in the 25 to 40 year old age group arrive at the clinic in congestive failure, especially women. Far advanced tuberculosis and leprosy were not unusual and several cases of small pox were seen.

Many cases of malaria, schistosomiasis (both hematobia and mansoni), hookworm, ascariasis, and amebiasis were seen each day. Severe anemias from a combination of hookworm and iron deficient diets were not unusual in children. Tropical entities seen less frequently were trypanosomiasis, filariasis, onchocerciasis and yaws.

Malnutrition and multiple vitamin defi-

ciencies were common, especially in children. One particularly pathetic child in this category arrived at our clinic (Figure 3). His name was Barmuh Joe, age approximately 22 months, and he was carried in by his father. The child's mother had died not long after his birth and his diet since that time had consisted mainly of rice water, rice, and the few scraps of food that the father could gather for him. He was apathetic, had a very distended abdomen without evidence of ascites, was anemic, and suffered from generalized edema. A diagnosis of kwashiorkor was made and the child was brought back to the clinic daily for doses of skimmed milk (we had a large supply of powdered milk) and vitamins and iron all mixed together which the child took eagerly. No evidence of parasitic infection could be found and marked improvement in his condition was made during the month prior to my departure.

Another interesting case was that of a 12 year old boy brought in by his parents who complained that he spent the greater part of each day sleeping. The boy was rather unresponsive and lethargic although he would answer questions when prodded. I was aware that trypanosomiasis was rare in our area as the tse-tse fly cannot stray far from the rivers and we were located a good 40 miles from any sizable stream. Upon questioning the parents, however, it was found that the boy had visited some relatives who lived near the St. John's River a few months previous. Physical examination disclosed enlarged occipital nodes and delayed hyperesthesia over both ulnae.

Fig. 1. The Clinic at Cuttington College and Divinity School on a typical general clinic day.

Fig. 2. The registered nurse at the Cuttington Clinic with a native mother and child. The child had no clothing and the mother was recently given her "lampa" skirt through contributions from workers in the clinic.

Fig. 3. The author and a young victim of kwashiorkor.

The patient was sent to Dr. Damiani's clinic for lymph node aspiration. Microscopic examination disclosed trypanosomes and treatment with pentamidine was started. Unfortunately, I departed before treatment could be evaluated.

COUNTRY MEDICINE

Often diagnosis and treatment were complicated by previous large doses of "country medicine," a term given to various concoctions brewed by members of the different tribes who billed themselves as healers. This type of medicine was often quite toxic and if the original illness did not bring the patient into the clinic, these home cures usually did. Our chief dresser, Edward, who no longer believed in "country medicine" lost his six-month old son when, in his absence, his brother-in-law gave the child one of these potions for a diaper

rash. The child died 3 hours after ingesting the "medicine."

VISITS TO OTHER HOSPITALS

Traveling in Liberia was limited by our lack of transportation. We did, however, have the opportunity of making a few visits to the Lutheran Mission Hospital at Zorzor and one to the Firestone Hospital on their huge rubber plantation. At the former location I found the senior doctor, Dr. Earl W. Reber, to be a 1945 graduate of my own medical school. My wife and I spent a very enjoyable 3 days here observing and helping with the hospital work. Zorzor has a relatively well equipped operating room which utilizes natural light via large two story windows. Many interesting surgical procedures were observed. Of particular interest also were the leprosy clinic attended by about 30 patients and the tuberculosis sanitarium adjacent to the hospital.

Firestone Hospital is a modern 200-bed institution extremely well equipped by most standards. It is the finest hospital in Liberia, bar none, and hence draws many interesting cases. It was here that I observed 15 patients with small pox. Located nearby, although I did not have the opportunity to visit it, is the Institute of Tropical Medicine where research into various aspects of tropical diseases is carried out in an academic atmosphere.

MY WIFE'S DUTIES

Originally my wife had been included in the fellowhip program to assist in the clinic laboratory and with interpreting one of the local tribe's languages which was basically Arabic. As we quickly learned, however, things rarely turn out as planned in the tropics. The laboratory was small and staffed by students who worked here as part of their college scholarship. The college authorities decided that she would be of far greater value assisting the one, overworked librarian in organizing and running the library (the largest one in the country). As she had former library experience, my wife was of great help here. Books were being received faster than they could be processed and there was a back log of many months. In addition, when one of the instructors was stricken with malaria and then hepatitis, she taught several classes in political theory, her major subject in college.

FIG. 4. Gbargna Clinic of the Liberian Public Health Service. Dr. Guilio Damiani, physician-in-charge.

FIG. 5. Dr. Earl W. Reber, a graduate of Temple University School of Medicine, who has served at the Lutheran Hospital, Zorzor, Liberia, since 1948. The woman patient beside him has osteomyelitis of the right tibia.

FIG. 6. The operating room at the Lutheran Hospital. A vesico-vaginal fistula is being repaired.

INDEPENDENCE DAY CELEBRATIONS

One of the high points of our visit occurred on July 26th, when we attended the Liberian Independence Day Ball at the presidential palace. Guests ran the gamut from the diplomatic corps in tails and medals through tribal chieftains in their native dress, to an occasional stray dog. At this function we were introduced to President Tubman and had an opportunity to thank him personally for his country's hospitality.

FREETOWN, SIERRA LEONE

One of our stops on the trip home was in Freetown, Sierra Leone where we toured the government hospital and met several of the staff members. Medical progress in this newly independent nation was definitely ahead of that in Liberia, probably due to the former British colonial influence. While in Freetown, I was interviewed over Radio Sierra Leone regarding the Fellowship program, in particular, and the interest of American doctors in medicine in the tropics, in general. In both Liberia and Sierra Leone, the doctor is highly esteemed and needed and the hope is constantly voiced that you will return with additional physicians.

CONCLUSION

In conclusion, I do not think I shall ever come into contact with a more patient, cooperative and grateful group of patients than the West African natives. One loses one's heart to the shy African children and parental cooperation, within the limits of education and communication, is excellent. Both my wife and I enjoyed our stay immensely and would not be averse to returning in the future, especially when Africa begins to have its own medical schools, as I would be extremely interested in teaching and practicing pediatrics at such an institution for a few years.

We wish to thank the Liberian government, Cuttington College and Divinity School, Dr. Guilio Damiani and Dr. Earl W. Reber for their help and hospitality. Finally, we wish to thank Smith Kline & French Laboratories for making this enriching experience possible. We can think of no improvement on the program as it now stands.

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John Richardson Young and Medical Student Research, 1803[1]

By FRANK P. BROOKS, M.D.[2]

IN THESE days of relatively abundant support for medical student research, it is tempting to regard this emphasis on research as peculiar to our own time. The recent publication of John R. Young's doctoral thesis at the University of Pennsylvania, Class of 1803, calls attention to the interest of both faculty and students in original contributions during the very early days of medical education in this country (1). The practice of requiring an original thesis for the M.D. degree was brought to Philadelphia from Edinburgh, Scotland, where the original members of the faculty received their own degrees. A review of those prepared by the Class of 1803 shows a variety of interest and techniques similar to what might be found among the papers presented before an undergraduate medical research society today. There were nine in the field of pharmacology, five of them dealing with the properties of indigenous plants which, it was hoped, might have important therapeutic uses. Two were clinical studies of disease entities and three were experimental studies such as might appear today from clinical research laboratories or departments of physiology or biochemistry. Interestingly, two dealt with the subject of digestion by the stomach, and both had employed human subjects and experimental animals in their studies. John Young's thesis stands out because of the emphasis placed upon experimental results, his measured criticism of internationally known authorities, and the clarity of his presentation. It may be as Bates has stated in a review of Young's thesis (2), that he was merely one of several students in the U.S. at that time who were attempting to study gastric digestion, yet his experimental design and firm insistence upon theories fitting his results is refreshingly modern and has much of the style of his distinguished successor in digestive physiology, William Beaumont.

John R. Young was born at Hagerstown, Maryland in 1782. He was the son of a physician who practiced in Hagerstown and who survived to the advanced age of 108 years. The son graduated from what is now Princeton University in 1799, at the age of 17, and, after assisting his father in practice for three years, entered the Medical School of the University of Pennsylvania in November, 1802. Little is known about Young other than his doctoral thesis. His portrait, splendidly preserved in color on a miniature in possession of the School of Medicine, shows a slender, sensitive face with a lively, intelligent expression. The dedication of his thesis to his father shows a warmth of feeling even in an age not characterized by modesty of expression. He must have had loyal friends, since one, a Mr. Mitchell, probably a classmate in medical school, served him as an experimental subject and regurgitated gastric juice, while another classmate, Oliver Spencer, was reduced to pursuading subjects to take tartar emetic, "for a considerable compensation", in order to obtain gastric content.

Young's teachers in medical school included James Woodhouse in chemistry who was complimented on his dexterity and skill by Joseph Priestley (3) but of whom Benjamin Silliman commented, "He appeared, when lecturing, as if not quite at his ease, as if a little fearful that he was not highly appreciated,—as indeed he was not very highly" (4). Caspar Wistar

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was his professor of anatomy and of his lectures, Silliman commented that he would not resist the temptation to attend them although he found it necessary to drop Dr. Benjamin Rush's course in the Institutes of Medicine. Young dedicated his thesis to Benjamin S. Barton, Professor of Materia Medica, who was best known as a naturalist and enthusiast for remedies obtained from local plants. His success as a teacher may be inferred from the dedication of five other theses in the class of 1803 to him.

The best known of Young's contemporaries among the students was Benjamin Silliman, shortly to become Professor of Chemistry at Yale, and later to help Beaumont identify the acid in human gastric juice as Hydrochloric Acid. Seven months after arriving in Philadelphia he received the M.D. degree and returned to Hagerstown. He published two case reports in the *Philadelphia Medical and Physical Journal:* one on the treatment of tetanus and one on the treatment of uterine hemorrhage. Our next and last source of information is his obituary on June 13, 1804. It has been suspected that he died of tuberculosis.

The thesis itself deals particularly with the role of the stomach in the digestion of food. He used two types of experiments in animals; those in which a small frog was introduced into the stomach of a large bullfrog and the digestion of the tissues of the smaller frog described in gross terms, and experiments in which the gastric content of animals was taken out and examined, or in which the material to be studied was introduced into the stomach in a linen bag at the end of a string and withdrawn at varying times to study digestion. His sole analytical technics were changes in weight and changes in the color of litmus. He induced vomiting in himself by irritating his fauces and utilized the services of a classmate who could ruminate and regurgitate his gastric content at will.

With these methods he concluded that there was an acid in the stomach content of man and experimental animals, based on the fact that blue litmus turned red. (Litmus should detect 1 part HCl in 50,000 parts water according to Krauch (5). He mistakenly identified the acid as phosphoric acid on the basis of its reaction with lead acetate. He described the digestion of tissues including bone and teeth once the ingested animal had died, but showed that digestion did not occur if the animal remained alive. For example, the extremity of a small frog resisted digestion even though its sciatic nerve was cut as long as the animal remained alive.

It is interesting to compare his thesis with that of his classmate, Oliver H. Spencer, of New Orleans. Spencer concluded that there was no acid in gastric content, since the vomitus of two human subjects after tartar emetic and the content of the stomach of three dogs and one cat after feeding did not change the color of litmus. Compared with Young's experimental technic, this seems a rather crude method of study.

Undoubtedly, some of the popularity of this thesis stems from the relation of the work to Beaumont's later studies and from the brief and somewhat spectacular career of the author. However, as a stimulus to current medical student research and as an example of relatively scientific reasoning in early 19th Century America, Philadelphia can be proud of John R. Young.

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"Typhus of Surgical Wounds" in the War Between the States[1]

By H. TAYLOR CASWELL, M.D.[2]

INTRODUCTION

THE wounded soldier in the Civil War who survived the initial trauma faced the specter of wound sepsis which frequently was many times more lethal than his original injury. Infection was responsible for what has been termed "the unspeakable agony of hospitalization". It was the fortunate casualty who had to deal only with the problem of local suppuration. Erysipelas, pyemia and tetanus were recognized as clinical entities and flourished in the traumatic wounds and in the surgical wounds of amputations which were so commonly employed for the treatment of these infections.

The descriptive term, "Typhus of Surgical Wounds", was applied by W. W. Keen (1), Union Army surgeon and later Professor of Surgery at the Jefferson Medical College, to a specific type of wound sepsis, Hospital Gangrene. This disease was an inexorably progressive septic necrosis which could sweep through the wards of the miltary hospitals of that era in the same epidemic fashion as typhus fever, smallpox, et cetera.

HISTORY OF HOSPITAL GANGRENE

It is difficult to be certain as to the true incidence in the centuries preceding the aseptic era of medicine because of variations in nomenclature. In the third book on epidemics by Hippocrates (400 B.C.) a malignant season is described in which phagadenic ulceration occurred. The recommended treatment was that of excision with a live cautery, which was still used in some cases during the Civil War period and is included as a therapeutic method in some modern papers on the subject. Galen (175 A.D.) described a similar type of ulceration and likewise recommended free excision and use of the cautery. At the siege of Rouen (1540), Ambroise Paré recommended incision around the wound, forming a trench to prevent the spread of hospital gangrene. Subsequent studies on the etiology of this disease show this method of therapy to possibly have a physiologic basis. It was at the siege of Rouen that both combatants accused the other of using poisoned rifle and cannon balls because of the high incidence of hospital gangrene following any type of injury.

The French surgeon, Mauquest de la Motte, of the Hotel Dieu, Paris, in 1722 described hospital gangrene as *la pourriture*, a term meaning rottenness, putrefaction or corruption. Hospital gangrene was accurately described as a distinct disease in 1783 by Pauteau. This French surgeon had contracted the disease himself while working as a dresser of wounded men and it is interesting to note that he was a strong advocate of contact as the most important cause of its spread. The infection was a scourge of the British Navy in the early 1800's and occurred in Napoleon's Armies. It was recorded during the Crimean War (1854–56), when it was particularly lethal in the French Army. The English had a much lower incidence because of their practice of moving infected cases immediately from the general hospital wards. Numerous papers were written describing hospital gangrene and its treatment in the first half of the nineteenth century. It was practically unknown in the United States prior to the Civil War, however, and apparently required large groups of wounded men

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under conditions of warfare to reach epidemic proportions.

DESCRIPTION OF HOSPITAL GANGRENE

Descriptions of the disease are remarkably similar in the writings of various authors in the late eighteenth and early nineteenth century. The infection began following some break in the cutaneous surface, ranging from a simple scratch or abrasion to extensive traumatic or surgical wounds. It was also noted to develop following lancet incisions, vaccination, and was a dreaded threat in bed sores. Characteristically, it began with a bright red outer border. Directly within this red border was an area of indurated, elevated, purplish skin which was exquisitely tender and approximately 1 to 2 cm. in width. Within these outer circles occurred a black leathery necrosis. The disease was relentlessly progressive and the central slough would slowly separate revealing boggy, edematous granulation tissue exuding malodorous purulent fluid. The disease was capable of involving huge areas of the body such as an entire extremity, thorax, abdomen, et cetera. As it progressed, the process invaded joints and could cause necrosis of major blood vessels with severe secondary hemorrhage. Symptoms of sepsis were marked and there was progressive deterioration of the patient's condition, with anorexia, high fever and signs and symptoms of bacteremia. The patients frequently entered a state of muttering delirium which was followed by septic shock and death. The odor emanating from these patients was such that more than one author stated that only those with the strongest stomachs and the greatest devotion were able to treat them or examine them. A Confederate gangrene hospital at Vineville, Georgia for example, was described as emitting a stench which permeated the entire neighboring area.

INCIDENCE

Much of the background material for this paper has been taken from the writings of Dr. Joseph S. Jones (2), a surgeon in the Provisional Army of the Conferderate States and prior to that, Professor of Chemistry in the Medical Department in the University of Louisiana at New Orleans. Dr. Jones was the author of a 300 page book on Hospital Gangrene published by the United States Sanitary Commission in 1871. The book was based upon his observations on hospital gangrene during the four years of the war. Following the war, Dr. Jones joined the faculty of the University of Georgia and his academic career was a distinguished one.

It is apparent that hospital gangrene was more common among wounded Confederate soldiers than in those of the Union Army. Much of this difference can be ascribed to the malnourished state of the average Confederate soldier, combined with the pitiful lack of medical supplies and problems which the Confederates faced in regard to adequate physical facilities for the treatment of their wounded men.

Dr. Jones stated that the first case of hospital gangrene which he encountered was seen in July of 1862. Following the Battle of Chicamauga, large numbers of Confederate casualties were brought to Atlanta with little or no facilities provided for their reception and care. Most of them had spent a week or more being transported to that city. Two hundred and forty wounded men were crowded into the Presbyterian Church in that city; all of them developed hospital gangrene in their wounds and the majority succumbed to the disease. From July through October 1864, in the Army of Tennessee, there were 3,000 reported cases of hospital gangrene. Severe outbreaks of the disease were reported by Union Army physicians following the battles of Fredericksburg, South Mountain, and Antietam. A number of these cases were treated in the large Union Army Hospital in West Philadelphia. A severe outbreak occurred at the Union Army Hospital at Annapolis, Maryland, in January, 1863.

Dr. Jones reported that at the Confederate Hospital in Vineville, Georgia, which was devoted exclusively to the care of hospital gangrene, that over one half of the nurses developed the disease—usually on the fingers or hands. Physicians, of course, were not immune

from its rigors and a number contracted it on their hands or fingers while caring for the wounded men.

Dr. Jones spent some time at Andersonville Prison in April of 1864. This notorious prison camp, the child of Ulysses S. Grant who refused to allow prisoner exchange, had thousands of cases of hospital gangrene. The infection could develop in the most trivial scratch, and amputees invariably developed it in the fresh surgical wound with almost 100 per cent mortality. During an epidemic of smallpox at Andersonville, an effort was made to vaccinate all the prisoners. After two or three thousand had been vaccinated, it was discovered that a large number had developed hospital gangrene in their vaccination sites, and the effort was discontinued.

ETIOLOGY OF HOSPITAL GANGRENE

It is a frustrating experience to read the thoughts of physicians of that era and to realize how close they were to realizing the bacterial etiology of disease and what it could have meant to the men under their care had they recognized the fact that the bacterial organisms which they knew to be present and could observe under a microscope were the sources of infection. The majority of authors felt that contact contamination of the wound or contamination of the wound by means of the surrounding air played a major role in the development of the infection. Dr. Jones performed complex chemical analyses of the urine in a large number of cases and conducted a survey among Confederate military surgeons in which a rather long and complicated form was to be filled out on every case of the disease and sent to him. He also conducted some animal experiments. In one of these he placed the slough from a case of hospital gangrene in an incision in the neck of a pointer dog. The dog developed severe infection rather promptly and finally survived only after spontaneous drainage and separation of slough had occurred. This result substantiated his feelings as to the importance of contact in the spread of hospital gangrene. He suggested that there were three principal causes of hospital gangrene. These were:

1. A debilitated, malnourished state.
2. The air around hospitals and crowded ships was loaded with animal exhalations and these exhalations, in turn, contaminated the wounds.
3. Contact of gangrenous matter with diseased and wounded surfaces.

He likewise felt that individual basins or rags should be used in the cleansing of wounds, and that the common practice of nurses going from case to case and dressing the infected incisions with filthy basins and rags played a major role in its spread. Dr. Jones likewise recommended a system of hygiene for hospitals which would still be acceptable today.

Briefly, these recommendations consisted of:

1. 2,000 feet of cubic air in a room per patient.
2. Every two weeks the ward be fumigated with burning sulphur, the walls whitewashed and the floors cleansed with sodium hypochloride.
3. After a patient with an infection had left the bed, it was recommended that the straw sacks be burned and the bed sacks boiled.
4. Unhealthy wounds were to be dressed with an ointment consisting of tincture of iodine, carbolic acid, and tincture of opium.
5. Dressings and soiled clothes were to be burned.
6. Patients with infection were to be isolated.
7. No amputations were to be done in a hospital where hospital gangrene was present.
8. Every effort should be made to prevent the development of bed sores.
9. Blood-letting was to be avoided.
10. Individual basins, sponges, and rags were to be available for every patient.

Both Dr. Jones and Assistant Surgeon Joseph J. Woodward of the Union Army studied the exudate from cases of hospital gangrene microscopically. Dr. Woodward stated, "nothing

seen except the ordinary bacteria which are to be observed in every decomposing animal substance" (1).

Dr. Jones' summarization of his microscopic studies was as follows:

"After a careful examination of various vegetable and animal matters exposed to the atmosphere under similar circumstances of temperature and moisture, I have come to the conclusion that in the present state of our knowledge we are unable to demonstrate that these animalcules are in any way connected with the origin and spread of hospital gangrene. The gangrenous matter appears to afford a nevus in which these simple forms of animal and even of vegetable life are rapidly generated and multiplied. As far as my observations extend, they showed that these animalcules will be generated with similar rapidity in urine containing albumin, or any nitrogenized body undergoing putrefaction in a warm moist situation like that of the wards of the hospital. The warmth of the human body also, without a doubt, affords a most favorable condition for the rapid development of the simpler forms of animal life. I have been unable to discover any forms of animalculi peculiar to hospital gangrene. I have been unable to establish any relation between the rapidity of the spread of the disease and the number and character of the living organisms". These microscopical investigations thus afforded only negative testimony upon the "animalcular" origin of hospital gangrene. Dr. Jones' report included color drawings of his microscopic observations; these reveal that the exudate was swarming with bacterial microorganisms! A century ago the microbial genesis of sepsis was as unknown as is the genesis of cancer today, despite the fact that bacteria had been observed through microscopes since the seventeenth century.

TREATMENT OF HOSPITAL GANGRENE

Systemic treatment of the disease included the use of quinine, muriate of iron, opium, and potassium perchlorate. The local treatment of the wound most commonly used consisted of the application of full-strength nitric acid followed by surgical débridement of all necrotic tissue. In most instances, this heroic therapy required chloroform anesthesia. Following this débridement, the use of flaxseed poultices was recommended. Other cauterizing agents had likewise been suggested, and the one recommended by a Philadelphia physician, Dr. Middleton Goldsmith, was highly thought of in the Union Army. This consisted of the application of full-strength bromine to the wound followed by surgical débridement of the slough. An additional advantage of the use of bromine was its deodorizing effect and Dr. Goldsmith had also recommended the use of bromine in open containers in the wards (3). In addition to these escharotics, the use of arsenic, copper, and live cautery also played a rôle in local therapy.

DISCOVERY OF THE BACTERIAL ORIGIN OF HOSPITAL GANGRENE

Following cessation of hostilities in the War between the States, the disease regressed to its minimal pre-war incidence. With the development of aseptic techniques, Gross's textbook of surgery of the 1870's (4) stated that the disease had disappeared. There was now little interest in a disease which to all intents and purposes was no longer a problem, although sporadic cases undoubtedly occurred. In World War I there is little evidence to show that hospital gangrene occurred although, of course, other types of infection such as erysipelas, tetanus, gas gangrene, and wound suppuration still had a significant incidence.

It was not until 1926 that Doctors George E. Brewer and Frank L. Meleney, of Columbia University, reported a disease which they termed "progressive synergistic gangrene," a condition which clinically is remarkably similar to hospital gangrene (5). Brewer and Meleney found that this unusual type of infection was caused by symbiosis between a microaerophilic non-hemolytic streptococcus and a hemolytic staphylococcus. These findings have been confirmed repeatedly since

then and many more authentic cases have been reported.

Recent personal correspondence with Dr. Meleney reveals that it is his feeling that Hospital Gangrene included a heterogeneous group of infections, both acute and chronic, including acute hemolytic streptococcus gangrene, progressive bacterial synergistic gangrene, chronic undermining burrowing ulcer, fusospirochetal gangrene, and gas gangrene.

It is the writer's opinion that the majority of cases of Hospital Gangrene, as reported by Dr. Jones, were a disease of similar etiology as reported by Doctors Brewer and Meleney as progressive synergistic gangrene. Hospital Gangrene presented a clinical picture characteristic of anaerobic infection. It was Brewer and Meleney, in this century, who elucidated the basic pathological process of Hospital Gangrene. After their report of 1926, Dr. Meleney continued a distinguished career in surgery and surgical bacteriology and it was in his laboratory, at Columbia University in 1945, that the antibiotic Bacitracin was discovered.

Modern surgical treatment is based upon meticulous débridement which our colleagues of a hundred years ago actually attempted to accomplish by escharotics combined with appropriate local and systemic antibiotic therapy. The organisms responsible for Hospital Gangrene, once a dreaded disease, have not been eliminated from our environment. They await with timeless patience the destruction of aseptic barriers which the surgeon has placed between them and the traumatic and surgical wound. It is conceivable that the use of atomic weapons in 1962 could not only fill the atmosphere with radioactive particles, but also with the overpowering stench familiar to those in the area of the Gangrene Hospital at Vineville, Georgia, in 1862.

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A Tin Coffin for the Siamese Twins

By ELLA N. WADE*

AMONG the thousands of specimens in the Mütter Museum of the College of Physicians, there is nothing, even the adipocere body of Mrs. Ellenbogen, our "petrified lady," that attracts more attention and elicits as many questions as the plaster cast of the Siamese Twins, Chang and Eng Bunker, made after the bodies had been examined and the autopsy performed by the Commission of two physicians. Dr. William H. Pancoast and Dr. Harrison Allen, appointed by the College.

For these twins, of entirely different dispositions, to live in comparative harmony for sixty-three years, not only with each other, but also, for a good part of their lives, with two different women and two large broods of children, speaks well for their ability to adjust to varying circumstances. As far as is known, nothing was ever written about the dispositions of the two sisters, Sarah and Adelaide Yates, who married them, but the fact that they married joined twins and orientals at that, puts them in a category apart from ordinary women, and one wonders if they really were attracted to the twins or to their ability to earn a good living as circus attractions.

Much has been written about Chang and Eng, and most of it has been repeated many times with minor variations, namely the number of children they sired. One would think that in eighty-eight years everything in connection with them would have been made public, but something new came to light the other day through an interesting visitor.

It started with an early morning phone call to the curator from the secretary of a Fellow of the College and its former president, Dr. Richard A. Kern. She said that a friend of Dr. Kern's, Dr. Worth B. Daniels of Washington, D.C., was coming to the museum to see the material we had on the Siamese Twins and he would like me to give him as much information and assistance as possible. She thought he would arrive about noon.

Between the covers of an old notebook we have receipted bills for the material for embalming the bodies of the twins, for the transportation of the bodies from North Carolina to Philadelphia, for photographs of of the bodies and anatomical drawings done after the autopsy. We also have an interesting scrapbook, presented to the museum by Dr. William Osler, containing handbills and pictures of the twins when they were exhibiting around the county. These, naturally, are not on display since they are old and would not bear frequent handling, but they are available to any reputable person, so they were turned over to Dr. Daniels who arrived about an hour after I received the telephone call.

When I first came to the museum in 1939, I spent months familiarizing myself with written and printed material on museum specimens as well as on anatomical and pathological exhibits. One becomes very familiar with the specimens after cleaning them several times a year and typing new labels, but anything read once twenty or more years ago is easily forgotten and so it was with much of the data on the twins. Dr. Daniels' visit was therefore a rewarding one for me as I also reviewed the material. In one group of papers I found a letter written to Dr. Allen by two of the children of Chang and Eng. Its contents may seem amusing to us, reading it today, but I venture to say that it was a serious matter indeed to the survivors of the twins. It reads as follows:

"Mt. Airy, N.C.
Apr. 1st, 1874

Dr. Allen

Enclosed you will find the receipt for bringing the bodies of Papa & Uncle from Salem to our home. You will please send the money by post-office order.

* Curator of the Mütter Museum and Clerk-technician of College Collections, College of Physicians of Philadelphia.

My Mother and Aunt was very sorry that we did not bring the lungs & entrals of our Fathers with the bodies home, and as we did not bring them, you can keep them until further orders from the families.

Respectfully G R & S D Bunker"

The museum only has the joined livers of the twins preserved in formalin, and it is not known whether the "lungs & entrals" were later ordered sent to Mt. Airy or disposed of in Philadelphia.

Among these papers was a receipted bill for fifty dollars from S. Gauland of 35 South 15th Street who furnished a walnut casket complete with lining and handles for the twins, together with "a case for same." And speaking of caskets brings us to the reason for writing this article. It is a photostat of a copy of a letter written by William Augustus Reich that Dr. Daniels gave me to add to other interesting documents on the twins.

Later, Dr. Daniels was kind enough to send me additional information on the letter that he had received from Mr. William K. Hoyt of Winston-Salem, North Carolina. Mr. Hoyt states that the original letter was given by the widow of Mr. Reich, a tinsmith, to the late Bradley Welfare, a neighbor, who for many years was circulation manager of the Winston-Salem newspaper. Mr. Hoyt received photographic copies from Mr. Welfare and it was from Mr. Hoyt that Dr. Daniels received his copies and from whom he received permission to use it. According to Dr. Charles Welfare, oldest son of Bradley Welfare, to whom Dr. Daniels telephoned, the whereabouts of the original letter is not known. A verifax copy of the photostat of the original letter that Dr. Daniels sent is hard to decipher.

Mr. Reich's letter which follows was written, presumably, to a sister.

"Mt. Airy, N.C.
Jan. 19, 1874

Dear Darling J

I write you a few lines this morning. I expect you heard the Siamese Twins are dead. I got an order late Saturday evening for a large tin coffin. I made it. I worked nearly all night, finished it about noon yesterday cut out yesterday afternoon & soldered them up. It was a sight the people that was there. It was a long time before I could get my foot in at the door so crowded. It was like a camp meeting so many people horses and carriages. It was most night before I got through soldering them up. They are not going to bury them but keep them in the house. I expect they are afraid somebody would steal them. The Siamese Twins is the greatest human curiosity in the world & who ever thought I would be the man to solder them up. I had to cut into 34 big sheets of tin to make the coffin have a notion to charge $20 do you think that would be about right? Their death was sudden & unexpected—on Friday night late yet they were unusually cheerful & went to bed all right. A little before day on Saturday morning Eng found his brother dead. He called for the family to get up, said he felt himself failing complaining of pains in his limbs & died about two hours after the other one. Chang the smallest one that died first had something like palsy about a year ago & I believe he got it again & died with it & as soon as he was dead the disease passed right into the other one. All the doctors went out Saturday morning prepared to cut them apart, but they were both dead when they got there. I heard somebody say that Chang had always been accustomed to liquor, but had not used any for a few days & perhaps caused a reaction. They had intended going out showing shortly had they lived. I wrote a letter to Edward Blum & he will probably put something in the paper about it. They were both real business men & had large families. I hope this will find your Leander doing well. I have a good deal of work just now, but we will come just as soon as we can fix things. Mary sends much love also respects to Martha. The Siamese twins were nicely dressed in black with slippers on I helped lift them in their coffin it was a strange sight. I must close with our best love I remain

Affectionately xxx
Augustus

It was a sight to see the people that came to my house to see me make the coffin. It was the greatest job I ever done. I sent you a sheet of tin I now xxxxx wagon you must go see xxxx I send you a drop of solder that dropped on the coffin as I was soldering them up yesterday."

(The xxx in the copy evidently are words that could not be deciphered.)

An article on the twins written by Dr. Arno B. Luckhart that appeared in *Surgery, Gynecology and Obstetrics*, in January 1941, reconciles the "tin" coffin made by Mr. Reich and the "walnut" casket for which we have the receipted bill. One paragraph states:

"Dr. Hollingsworth did not reach the house until after the death of both of the twins. He found the wives, and especially the children, averse to any postmortem being made, but, after much persuasion, obtained permission to put the bodies in a position to be preserved until he could obtain someone from Philadelphia to perform the autopsy. He placed the bodies, after they had been thoroughly cooled, in a coffin, which was put in a wooden box, which was in its turn encased in tin; the whole being buried in a dry cellar in such a way as to be imbedded in charcoal."

The Mütter Museum is indeed indebted to Dr. Daniels for bringing this interesting letter to our attention and grateful to him and to Mr. Hoyt and Dr. Welfare for permission to make it public. It is amusing to read of Mr. Reich's deductions as to the cause of the death of Eng and also his inference that the bodies were kept in the house because the family were afraid somebody would steal them. One can almost feel his excitement, too, as he penned the letter to his relative telling of his connection with "the greatest human curiosity in the world."

Memoir of Frederick Fuller Russell (1870–1960)*

By TOM F. WHAYNE, M.D., DT.P.H.

BRIGADIER General Frederick Fuller Russell was born in Auburn, New York, on August 17, 1870, and died in Louisville, Kentucky, on December 29, 1960. His life span of ninety years embraced exciting periods in the development of modern medicine and it was his talent and privilege to contribute magnificently to medical advances during almost seven decades after receiving his M.D. degree from Columbia University in 1893.

After a graduate year at the University of Berlin during 1897–98, Dr. Russell was commissioned as a Lieutenant in the Medical Corps of the United States Army. He advanced through the grades to the rank of Colonel and retired in 1920.

In 1921 he was appointed as a Brigadier General in the Reserve Corps of the U. S. Army, which in itself was an unusual recognition at that time. His Army medical career began during a productive and distinguished era of military medicine. The Army Medical School in Washington, D. C., had become a center for research and field investigation in bacteriology, epidemiology and preventive medicine. An enthusiastic young staff under the preceptorship of Surgeon General Sternberg and Visiting Professor William H. Welch of Johns Hopkins University was fired with zeal for medical investigation which resulted in the new knowledge of the etiology and control of yellow fever, the etiology and treatment of beri-beri, the fundamental control of hookworm disease, the successful treatment of amoebic dysentery, and a practical method for purification of water through the use of chlorine. It was after service in the Spanish American War and observation of the tragic loss of American soldiers from typhoid fever that F. F. Russell joined the staff of the Army Medical School in 1907 as Instructor in Bacteriology and Medical Microscopy. Such an environment was congenial for so gifted a teacher and investigator and it was here that some of his most notable contributions were made. These included the introduction of typhoid vaccination in the United States Army in 1908 and its later acceptance as a major control factor in the civilian populations of this and other countries. General Russell was made Professor of Bacteriology, Pathology, and Preventive Medicine in 1913 and continued on the faculty of the Army Medical School until his retirement in 1920. From 1909 to 1913 he also served as Professor of Bacteriology and Pathology at the George Washington University Medical School, and throughout his service in Washington he was Curator of the Army Medical Museum. During one year, 1913–14, he was Lecturer in Tropical Medicine at the New York Postgraduate Medical School.

He was chosen to organize and direct a Division of Laboratories and Infectious Diseases in the Office of the Surgeon General during World War I, which carried with it the responsibility for developing the preventive medical and environmental sanitation programs for the Army in training at home and in combat abroad. During the immediate pre-war period he served for two years, 1915–17, as Chief of the Board of Health Laboratory in the Panama Canal Zone, and for one year after the war he was the Army Medical Service's representative to the National Board of Medical Examiners and delegate to the American Medical Association. Shortly after the end of the war he was awarded the Distinguished Service Medal. It was characteristic

* Prepared and published at the request of the Council of the College of Physicians of Philadelphia.

of General Russell that throughout his long and productive career after retirement from the Army, he referred to himself as Colonel Russell in deference to the highest rank he had held during his service as a regular officer.

Upon retirement in 1920 General Russell became Director of the Public Health Laboratory Service of the International Health Board of the Rockefeller Foundation. He succeeded to the General Directorship of the International Health Board in 1923. After thirteen years as General Director, during which period he also served as a member of the New York State Public Health Council, he "retired" once again to become Professor of Preventive Medicine and Epidemiology in the Harvard Medical School and the Harvard School of Public Health. Three years later he became Emeritus Professor, but continued to occupy an office in the Department of Epidemiology in the School of Public Health and to participate actively in the teaching program. As late as the academic year 1948–49, he regularly attended the advanced epidemiology seminars and often put mature students on their mettle to discuss penetrating questions and observations. A hobby was photography and he was often seen emerging from the darkroom with his latest developed prints, scornful if they did not measure up, very pleased if they were good. He took special pride in a first award in an amateur photography contest.

In his ninth decade, in the early 1950s, he moved to Louisville, Kentucky, to be with his only son for the remaining years of his life. There he continued his hobby of photography and carried on an active correspondence. The Dean of the Medical School of the University of Louisville, Dr. J. Murray Kinsman, noted in a memoir published in the *Transactions of the Association of American Physicians*, Volume LXXIV (1961), that, "during this twilight period he refused to be idle, maintaining an active interest in his chosen field, coming frequently to the Medical School to give an occasional lecture and to listen to other visiting lecturers." Dr. Kinsman also noted that he, "was a faithful attendant at the weekly research seminar held every Friday afternoon."

General Russell received numerous honors and awards, some of them from the many professional societies to which he belonged, some of them from foreign medical societies and foreign governments, and some as honorary degrees from American universities. Among these honors was his election as an Honorary Fellow of the College of Physicians of Philadelphia in 1942.

Frederick Fuller Russell was a moving and influential force in medical progress during the first half of the twentieth century. His contributions were substantial in teaching, research, medical administration, and medical statesmanship. He was retiring and modest and possessed of a direct but warm and friendly personality that attracted many lifelong friends. The medical profession and the nation are greatly in his debt.

Memoir of Horatio C. Wood, III (1904–1961)*

By LEWIS C. SCHEFFEY, M.D., SC.D. (HON.), L.H.D. (HON.)

IT HAS been said with good reason that the Wood family, with its related Packard and Bacon lineage, has given much academically, with substance and with vigor, to the life-line of the College. Moreover, it is well to pause and recall that the founding of the College of Physicians of Philadelphia, in 1787, was concurrent with the adoption of the Federal Constitution by the fledgling Congress of the United States of America.

A forceful pattern of influence, originating with the dependable interest and long-sustained Presidency of George Bacon Wood (1848–79), was again apparent in the erudite leadership and character of Horatio Wood, Senior, who served two terms as President of the College (1902–04). His administration was augmented by sincere attachment to the institution, and the Wood Room today recalls his dedication.

The late Horatio C. Wood, III, the subject of this Memoir, was elected a Non-Resident Fellow on January 8, 1952. He was the only son of our recently deceased Fellow, Horatio C. Wood, Jr. (1874–1958), whose Memoir was read before the College, 7 October 1959.

The career of Horatio C. Wood, III, was a truly versatile one. The term "versatile" is used much too often, and not always in conformity with Noah Webster's chosen syntax, to wit: "having many aptitudes; many sided." In the author's opinion, Wood deserved the term and its connotations.

One can speak feelingly of this gracious, capable, and lovable person, whose interests were truly many sided. There was no dearth of ideas, nor lack of capacity to formulate and pin-point the facets of his activities.

Born January 7, 1904, young Horatio Wood, at the age of 24, after brief attendance at Phillips Brooks Academy, had graduated with honors from the William Penn Charter School, and had been granted B.S. and M.A. degrees from Haverford College. He then spent a year or more as a reporter with the "Philadelphia Evening Bulletin", married and fathered a son, Horatio C. Wood, IV, and twin daughters, Ellery (Mrs. Vance Swope Elliott), and Lovell (Mrs. Clifton Royston, Jr.). This marriage, to Olive Anderson, terminated in divorce. In 1954, he married Louise Seiwell, since deceased.

While still in his twenties, Wood entered the field of advertising, in which he was eminently successful. After working with the well-known Ayer firm in Philadelphia, he founded his own business, that of Wood and Fielding, located in the Washington Square area. It should be emphasized that this period of dynamic activity spanned but a single decade (1927–37) before his thirty-third birthday!

Now came a radical change in perspective. Whether his motivation to enter medicine was a matter of personal concern, or was designed to maintain familial solidarity in the tradition of the Wood family, is problematical. Be that as it may, he returned to Haverford College, and obtained the necessary prerequisites for acceptance at the Medical School of the University of Pennsylvania.† He graduated in the Class of 1938. The Alpha Mu Pi Omega fraternity accepted him into its brotherhood. At the medical school, he was the natural choice of his classmates when it came to the selection of an Editor for the "Scope" yearbook. The acumen which Horatio Wood carried into this endeavor resulted in a splendid and much appreciated volume.

An internship at the Bryn Mawr Hospital

* Prepared and published at the request of the Council of the College of Physicians of Philadelphia.

† Dean Cadbury at Haverford recalled that he had taught both father and son in premedical courses—the father in 1932, and the son (H. C. W. IV) in 1948.

followed. That the field of psychiatric study was beckoning might be deduced from the aptitude that earned for him ample opportunities for graduate honors, notably an appointment as a Rockefeller Fellow in Psychiatry. Opened to him were positions in research, administration, and practice, among which a notable one was at the Silver Hill Foundation at New Canaan, and Norwalk, Connecticut. Consultive work and academic opportunities lured him back to his native Philadelphia, at the Medical School of the University of Pennsylvania.

Weeks and months went by; the clouds of World War II dimmed the horizon. A ranting Hitler had come to power in 1933. Three years later his troops marched into the Rhineland, with wooden guns it was said! The Pentecost of calamity was at hand.

In July of 1943, Doctor Wood was commissioned a Captain in the Army of the United States, assigned to the Air Corps. During his three-years' service he was assigned to seven different theaters of action. Following his induction at Carlisle Barracks, Wood was a ward medical officer at Kern, Utah. Chiefships in Psychiatry followed in sequence at Ephrata, Washington; Blythe, California; and Walla Walla, Washington. Assignment at Geiger Field, Washington, and a course in aviation medicine at Fort Logan, Colorado, were followed by his advance in rank to Major.

He merited the American Theater Ribbon and the World War II Victory Medal. Honorable discharge came in July 1946. Major Wood had given devoted service to his brothers-in-arms, a group that warranted the best efforts that he could give. In company with his Senior Officer, Colonel Lauren H. Smith, Neuropsychiatric Consultant of the Ninth Service Command, Fort Douglass, Utah, Captain Wood was joint author of a particularly readable and readily grasped scientific paper entitled, "The General Practitioner and the Returning Veteran" (*J.A.M.A.:* Vol. 129, pp. 190–3, 1945). This report was a gem of sensible and down-to-earth exposition concerning the problems he encountered during days with the troops . . . days gone, but not forgotten, in his "right-about-face" to the multitudinous tasks of peace time that awaited his interest and challenged solution. It should be emphasized, however, that in no sense of the word did he consider himself as militarily inclined.

An academic affiliation with the Medical School of Northwestern University was awarded him, a privilege that he cherished. In the Philadelphia area memberships were open to him in several private groups, notably the "IV Street Club". All of these activities increased the responsibilities that were to demand more and more of him, as interests multiplied and work days lengthened.

The fifteen years that followed the end of World War II brought to Horatio Wood a maturity and productivity of mind and soul, broadening and enriching the principles for which he was ever wont to battle. A direct quotation from a privileged letter sent the author by Horatio C. Wood, IV, tells to far better advantage than anyone else could how certain and distinctive were the traits of his deceased father: "He was a courageous man, sensitive to human suffering of all sorts, in a way which lit him up with determination and dedication. He applied himself in a total way—body, soul and mind—to the task at hand. His medical work was his bedrock, but his other missions sprang like granite outcroppings from his central theme."

And a further quote: "His capacity for dedicated work was rarely harsh in any way. The sustaining power was a glowing coal—like his ever-present pipe. The only times that I remember that coal bursting into flame was when he encountered human suffering which derived from racial or religious bigotry".

Doctor Wood lived his beliefs. A member of the Religious Society of Friends, he was active in the Meeting. He also headed the steering committee that organized a local group of the American Civil Liberties Union in 1961.

Peoria, Illinois, adopted Doctor Wood when he accepted the Medical Directorship of the

Michell Sanitarium there in 1946. Practice quickened, and patients increasingly put their faith and hope in his competent hands. The Dearborn Athletic Club in Chicago, and the Country Club of Peoria, did not see a great deal of this distinguished member.

Top academic groups in the psychiatric field, viz. the American Board of Psychiatry and Neurology, the American Psychiatric Society, and the parent Illinois State Society benefited from his membership. The Philadelphia Psychiatric Society also saw him from time to time on visits to the East. Association with organized medicine was evidenced by faithful attendance at the Peoria County Medical Society, and the A.M.A. Sectional Meetings. He was interested in the affairs of the sociology department of Bradley University. Likewise he had worked with the Walla Walla Interracial Committee, having been its early chairman in 1946. He wrote prolifically in his specialty; the themes were pertinent and written in scholarly, yet lively fashion, for instance: "Psychiatry—Its Relation to Philosophy and its Contribution to Human Welfare", and "The Psychiatrist looks at Race Relations", articles broad in scope.

The comments of his colleagues were not only sincere in their appreciation of his work, but of a personal nature that was affectionate and touching. He was known to his family and intimates as "Beau" or "Beausie". His sister, Mrs. Florence Wood Hacker, has kindly furnished pertinent letters from family and personal friends. It is from these that I am able to quote a few excerpts. In a letter to Horatio C. Wood, IV, a colleague of his father wrote feelingly: "That your father's life was troubled and that he strove for mastery, and often achieved it, is something also of worth to know. I greatly admired his courage in fighting for unpopular causes he believed in. . . . He never could calmly accept the imperfections in himself or in the world, and tried more than was humanly possible to deny his own imperfections. Probably the great tragedy of his life was that in trying to conquer his imperfections he felt so unworthy that he could not communicate and value the worth of his own life enough. . . . Beau's death has left you and your family shaken, as it has all of us who cared for him. I can only say I know of no one who worked harder to make the world around him a finer place; that he broke in the struggle leaves me infinitely sad and infinitely humble. If only his friends could come to Peoria, to see the good one man can do. He only tried to do more than any human could."

An important recent letter by Dr. Wood may well have been written with the realization that he had actually over-reached his capacity for sustained effort. In it he listed successively by number and title, the professional assignments that were a "must", week by week. This was followed by other designated obligations, and closed by a comment termed, " 'house and grounds'—(i.e.) Time for writing and nonprofessional reading, and time for all the other little odds-and-ends gets crowded out! But what I'd really like to do is to find time for it all."

When requested by the Council to prepare a Memoir of Horatio C. Wood, III, for publication, it was satisfying to have come to know him personally several years ago. I met him sometime after the presentation of the Memoir of his father, Horatio C. Wood, Jr. (1874–1958), at his widowed mother's home. From then on, there was correspondence at intervals, and I have keen recollections of Doctor Wood's courtesy and friendliness. The author treasures a manuscript entitled "Some Problems in Psychiatry and Medicine", a paper read at a meeting of the Illinois Psychiatric Society (March 21, 1959). A copy came to me inscribed with the compliments of our late friend. The recollection of this noble man, his virtues and his sorrows, will remain long in memory, as it will in the Archives of this College he loved and honored.

In conclusion may be added this personal comment from an intimate friend of Doctor Wood: "Beau was always a rock to anyone who needed him. The tragedy of life is that rocks cannot lean . . . they can only crumble."

Dr. Albert Schweitzer (1875–), Physician, Philosopher, Theologian, Musician. Nobel Peace Prize laureate, 1952. (Portrait by A. Dubois, 1949. Courtesy of Howard C. Rice, Jr., Princeton University Library.)

TRANSACTIONS & STUDIES
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College of Physicians of Philadelphia

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Dr. Albert Schweitzer: Our New Honorary Fellow

By THOMAS M. DURANT, M.D.

PERHAPS the best way to introduce our new Honorary Fellow (for those who might need an introduction) is to quote from his own writings:[1]

"The operation is finished, and in the hardly-lighted dormitory I watch for the sick man's awaking. Scarcely has he recovered consciousness when he stares about him and cries again and again: 'I've no more pain! I've no more pain!' His hand feels for mine and will not let go. Then I begin to tell him and the others who are in the room that it is the Lord Jesus who sent the doctor and his wife to the Ogowe, and that white people in Europe gave them the money to live here and cure the sick Negroes. Then I have to answer questions as to who these white people are, where they live, and how they know the natives suffer so much from sickness. The African sun is shining through the coffee bushes into the dark shed, but we, black and white, sit side by side and feel that we know by experience the meaning of the words: 'And all ye are brethren' (Matthew xxiii, 8)."

After Dr. Albert Schweitzer's election, I had the honor of writing to him in Lambaréné. In my letter I described briefly the history of the College of Physicians of Philadelphia and its present function in American Medicine. His reply is a remarkable document, expressing appreciation with the humility so often found in great men whose lives are dedicated to lofty ideals. The letter is reproduced in this issue of the *Transactions & Studies*, together with my translation. The original letter will be preserved under glass at the College. Characteristically, its two pages are fastened together with a loop of white cotton, a way of avoiding rusty paperclips in tropical Africa.[2]

It is a privilege to welcome to College Fellowship this great man who has been in one lifetime, a pastor, theologian and philosopher, a master musician, a fine physician, and above all, one who has displayed "reverence for life" during many years of dedicated service to suffering humanity.

[1] *On the Edge of the Primeval Forest*, By Albert Schweitzer, New York, The Macmillan Company, 1948, pp. 62–63.

[2] *The Three Worlds of Albert Schweitzer*. By Robert Payne, Bloomington, Indiana University Press, 1961. p. 165.

Monsieur Thomas M. Durant, B.S. M.D.
Président du College of Physicians of
Philadelphia.

25 juin 1962

Monsieur le Président

J'apprends par votre lettre du 13 juin que j'ai été élu par les Fellows of the College of Physicians of Philadelphia Honorary Fellow de votre illustre Corporation. Je sais estimé le grand honneur que vous me faites et vous en suis profondément reconnaissant. Veuillez, je vous prie, transmettre l'assurance de ma reconnaissance à tous les membres de l'organisation.

Je connaissais, par l'enseignement que j'ai reçu dans ma jeunesse, le grand rôle qu'a joué Philadelphia dans la première époque de l'histoire de l'Amérique et j'ai appris à la Faculté de l'Université de Strasbourg que dans cette ville se trouvait la première Faculté de Médecine des Etats-Unis. Et voici que je suis en relation avec ce College, grâce à votre bonté.

Certainement je ne manquerai pas de rendre visite à votre College quand je serai en Amérique. Mais hélas, vu mon âge et le travail que j'ai encore à faire, il y a peu de chance que je puisse encore venir aux Etats Unis. Mais c'est déjà très beau que je puisse être en relation spirituelle avec vous.

J'ai fait mes études en médecine à Strasbourg et à Paris. J'ai fondé mon hôpital de Lambaréné en 1913, quand la maladie de sommeil faisait ses ravages en Afrique Equatoriale. C'était une lutte très dure. Parfois j'avais 60 malades de sommeil dans la baraque primitive dans laquelle je logeais mes malades.

Ensuite c'était la grande lutte contre la lèpre, lutte victorieuse à partir de 1941 grâce au médicament que l'USA mit à notre disposition.

A présent c'est la chirurgie qui joue le plus grand rôle à mon hôpital. Les hernies sont très nombreuses en Afrique Equatoriale, et beaucoup d'hernies, malheureusement, nous arrivent incarcérées.

Nous sommes à mon hôpital 6 médecins et 15 infirmières européennes. A cet hôpital j'ai la place pour 440 malades. Au village des lépreux, que j'ai construit en 1955 à une certaine distance de l'hôpital, 170 des pauvres êtres peuvent loger. L'hôpital est situé au bord de la forêt vierge. Deux grandes routes conduisent à présent à travers la forêt vierge. Autrefois elle n'était accessible que par des sentiers. A présent des automobiles peuvent nous amener les malades des régions lointaines. Ce grand progrès existe depuis 1960.

Avec mes bonnes pensées pour vous, Monsieur le Président et Messieurs les Membres du Collège

votre dévoué et reconnaissant

Albert Schweitzer

Doctor Albert Schweitzer
Lambaréné, Gabon
West Equatorial Africa
25 June 1962

Thomas M. Durant, B.S., M.D.
President of the College of Physicians of Philadelphia

Mr. President

I understand from your letter of 13 June that I have been elected by the Fellows of the College of Physicians of Philadelphia Honorary Fellow of your illustrious organization. I appreciate the great honor that you have bestowed upon me and I am deeply grateful to you. Please, I ask you, convey my gratitude to all the members of the organization.

I knew, from the instruction that I received in my youth, the great role that Philadelphia has played in the initial epoch of the history of America and I learned at the Faculty of the University of Strasbourg that in this city was founded the first Faculty of Medicine in the United States. And here I am now a member in relationship with this College, thanks to your kindness. Certainly I shall never miss visiting your college when I am in America. But, alas, at my age and with the work that I have yet to do, there is little chance that I will be able to visit the United States again. But it is very fine that I am able to be in spiritual contact with you.

I made my medical studies at Strasbourg and at Paris. I founded my hospital of Lambaréné in 1913, when the sleeping sickness ravaged Equatorial Africa. It was a very hard struggle. Sometimes I had sixty sleeping sickness patients in the primitive barracks in which I lodged my patients.

Next it was the great struggle against leprosy, a victorious struggle, which was ended in 1941 thanks to the medicine that the United States placed at our disposal.

At present it is surgery that plays the greatest role at my hospital. Hernias are very numerous in Equatorial Africa, and many of the hernias, unfortunately, reach us incarcerated.

There are at my hospital 6 doctors and 15 European nurses. At the hospital I have room for 440 patients. At the leper village, which I constructed in 1955, a certain distance from the hospital, 170 of these unfortunates can be lodged. The hospital is located on the edge of the primeval forest. More large roads now lead through the primeval forest. Formerly it was penetrated only by paths. At present some automobiles are able to bring us the sick from distant regions. This great progress has come about since 1960.

With my best thoughts for you, Mr. President, and for the Members of the College.

Your devoted and grateful.
Albert Schweitzer

Normal and Abnormal Function of the Parathyroids[1]

By JOHN EAGER HOWARD, M.D.[2]

THOUGH the diagnoses of hyper- and hypoparathyroidism are now by no means rare clinical entities and are relatively familiar to most practitioners of medicine, it must be recalled that our knowledge of the function of these tiny glands began only about fifty years ago. I shall try to review for you the development of our information as it exists today and share some experiences based on personal observation of 125 patients with active adenomas which have been removed and of 50 patients with hypofunction of the parathyroids.

A bit about evolution and the historical development of our knowledge of the parathyroids is perhaps a good way to open the discussion and to provide perspective. So far as I am aware, all mammalian vertebrates are equipped with parathyroid glands. Interestingly enough, there is in the bony fishes a small mass of epithelioid cells derived from pharyngeal epithelium, hypertrophy of which, under certain stimuli, is associated with fibrosis and loss of calcium from the bones, strongly reminiscent of hyperparathyroidism in man (1). But the fishes with *cartilaginous* skeletons seemingly lack such tissue, and it seems highly significant that Urist has found that sharks and their ilk have plasma calcium ion concentrations far higher than do those of us who have bony skeletons (1).

The anatomy of the parathyroid glands,[3] as distinct from the thyroid in man, was denoted by Sandstrom in 1880 (3), again by Gley (4) in 1891. But it was Swiss surgeons and physiologists in the early nineteen-hundreds who pointed out the connection of these minute structures with the muscular spasms which occurred after their inadvertent removal during thyroid surgery, and by Vassale and Generali (5) when purposely extirpated in experimental procedures. The pediatricians noted the identity of the symptoms to those of rachitic tetany, which had been suspected to be associated with low calcium in the blood;[4] and in 1908 MacCallum and Voegtlin (6) discovered that the seizures following parathyroidectomy were due to hypocalcemia and could be completely aborted and overcome by injection of calcium salts. Though simple saline extracts of fresh animal parathyroids were then tried by clinicians, including Halsted, and indeed with evident effectiveness, the accompanying abscesses in the subcutaneous tissues soon resulted in abandonment of such efforts. Oral preparations proved to be totally inert.

It was not until 1925 that Collip (7) (8) provided sterile, stable and potent, though crude, extracts. Thereafter important strides were made in an understanding of the function of the parathyroids. The great Viennese pathologist, Erdheim, and his students had noted skeletal and dental lesions accompanying anatomical abnormalities of these glands, and osteitis fibrosa cystica was suspected as being somehow secondary to parathyroid dysfunction (9). Mandl, also of Vienna, in 1925 removed a tumor from the neck of a patient suffering with severe cystic bone disease, and the patient's health improved dramatically following the procedure (10). The stage was

[1] Mary Scott Newbold Lecture LXXXIII, College of Physicians of Philadelphia, 4 April 1962.

[2] Professor of Medicine, The Johns Hopkins University, Baltimore 5, Maryland.

[3] Rasmussen and Reifenstein say that "the parathyroids were first recognized in 1852 by Richard Owen during his dissection of an Indian rhinoceros" (2).

[4] These were later proved by Howland and Marriott to be due to hypocalcemia (32).

now set for du Bois' group in New York and the clinicians at the Massachusetts General Hospital, including Aub, Bauer, Albright (11), Churchill and Cope, to find a group of patients, outline the clinical picture and define diagnostic criteria for recognition of over- and under-function of the parathyroid glands. Many fruitless operative explorations on Captain Markell, culminating in the final disclosure and removal of his tumor from the mediastinum by Dr. Oliver Cope, only to have him die of complications of his disease soon thereafter, forms but one of the dramatic episodes in the unfolding of the picture which we now find relatively commonplace in clinical medicine. But there are still many gaps in our knowledge of just what these little glands do and how they do it, as will become all too evident as this discussion proceeds.

We learn about functions of glandular organs usually in three ways: (1) what happens as the result of their extirpation, (2) observation of nature's experiments in which, by disease or by tumefaction, either under- or over-production of hormone is provided, and (3) by chemical extraction of the glands and exhibition of the extracts to the experimental test object.

The target organ of the parathyroid hormone, which is the most readily visible to us, is the skeleton. And one cannot discuss the parathyroids without bringing in the bones. It looks as though the hormone tended to operate on the bones mainly to bring about resorption. In order to understand this, it is helpful to view the enormous boney mass in terms of minute units, much as one thinks of the kidney in terms of individual nephrons. For the hard or lamellar bone, the unit is the osteone, with its central blood supply; and for the cancellous bone, the trabecula, bathed in juices from the marrow cavity's capillaries (12). Bone is a tissue very much alive, with constant degradation and new formation going on. It is believed, and on good evidence, that the bone cells, which ensheathe the trabeculae and line the osteones, do all the business, both formation and destruction—by their activity under one stimulus laying down matrix and maturing it to a state of calcifiability into which apatite crystals are deposited; and, on the other hand, under different stimuli, causing the crystals and matrix to melt away—always together. The parathyroid hormone seems to stimulate the bone cells mainly in the direction of destruction; and whether induced by a spontaneous tumor, by over-dosage of the hormonal extract or by implantation of parathyroid tissue beneath the periosteum, the picture is that of osteitis fibrosa. But it should be emphasized that the parathyroid hormone is but one of the stimuli that affects the bones, and in the speaker's opinion by no means the one which carries the most weight. For local factors seem to affect the bones with great force—disuse can cause rarefaction of a bone faster than anything we see in hyperparathyroidism. And no matter what the destructive forces or how great, one sees always evidence of reparative process going on coincidently, often side by side, even in the most severe rickets (13), for example. These other factors which influence the behavior of bone cells are often forgotten in the clinician's excitement of determining the cause of an hypercalcemia or of a pathological bone.

The most amazing thing about the skeleton to the philosophically minded physiologist (if such there be) is the homeostatic control of the calcium concentration of the extracellular fluids. Derangement of this mechanism resulting in either high or low serum calcium is, as you well know, disastrous for the organism. And, since the bones have within them practically all the calcium of the body, it is obvious that the relationship between bone resorption and construction really governs the serum calcium concentration. How this delicate adjustment is so beautifully managed under such widely diversified situations in the normal is one of nature's most fascinating marvels. So, as will become more apparent anon, when we have hyper- or hypocalcemia

present, we can rest assured that something is awry with the normal stimuli which affect the skeletal cells, or something is wrong with the cells themselves in their capabilities of response (14) (15) (12). As with other hormones, the parathyroid operates on basic chemical systems already present; it does not initiate a new biochemical process. For when one deprives a man of his parathyroids with resulting fall of serum calcium, one changes a mechanism which behaves much like the wall thermostat. The serum calcium is now set—for example, at 6 mg. % instead of 10, to be sure—for further artificial additions or depletions of calcium produce a response just as in the normal—i.e., accretion of blood calcium by the bones or mobilization of skeletal calcium to bring the level back to the level of 6 where the calciostat is set (16) (17). The same is true of the hyperparathyroid state; injections of calcium salts induce but a short lived increase in the already elevated serum calcium; prompt restoration to the previous level of hypercalcemia ensues (18).

Though I have indicated my belief that it is by no means the dominant force in calcium homeostasis, the parathyroid hormone does seem to be a sort of first line of defense in maintaining the stability of the calcium ion concentration. The only known stimulus to the parathyroids is a lowering of serum calcium,[5] as first shown directly by Patt and Luckhardt (19), and by quite convincing evidence, mostly indirect, that the parathyroid ceases to produce hormone when serum calcium rises (18) (20). To my knowledge there has never been proof that alteration in phosphate ion concentration affects the parathyroid function *directly*, though it has always seemed to us logical that elevation of serum phosphorus would make it more difficult for the bone cells to release calcium from the skeletal stores, hence a tendency for serum calcium to fall and thus *indirectly* a phosphorus rise would call forth a parathyroid response.

There is no doubt that the parathyroid hormone affects renal management of phosphorus. The parathyroprivic organism reflects this most dramatically by an enormous outpouring of phosphorus in the urine in response to an injection of hormone (21), and this occurs also when the organism has previously been deprived of phosphorus and the kidney is attempting to conserve all the phosphorus it can (22). As with all hormones, it seems likely that that of the parathyroids affects many tissues and that we are simply as yet unable to denote these effects.

Recent purification of the parathyroid hormone by the exacting and beautiful technical work of Rasmussen (23) has served to fortify the above conclusions as to the function of the parathyroids; the pure stuff has behaved just as did the cruder material or the parathyroid tumor's hormone in all respects (24). Dr. Rasmussen's three active polypeptides, the largest of which is of a molecular weight of 8600, all have both calcium mobilizing and phosphaturic properties, making it more and more likely that there is but one parathyroid hormone—a subject of much controversy among physiologists over the years. Recently a series of ingenious experiments by Dr. Harold Copp has led him to believe that there is another material which the parathyroids secrete, which tends to act quickly toward *lowering* the serum calcium when it has risen suddenly from some cause (25). Such a function would make the parathyroid of homeostatic importance against both hyper- and hypocalcemia.

With this broad and highly incomplete picture as a background, let us now turn to the clinical application of what we have visualized at the more basic level. Since we know only what the hormone does and, to some extent, where, but do not know how it does it, we are considerably hampered in our approach

[5] For brevity's sake, the terms serum calcium and phosphorus refer to the diffusible or ultrafilterable calcium and to phosphorus in terms of the orthophosphate phosphorus.

to the patient who is sick from either hyper- or hypoparathyroidism.

The Clinical Picture of Hyperparathyroidism

One might conclude from what has just been said that the clinician will best recognize hyperparathyroidism by noting an abnormality of the skeletal system. Twenty-five years ago this was indeed the case, and the majority of patients in whom this diagnosis was made were referred by orthopedic surgeons from whom the patients had sought aid because of pathological fractures in areas of advanced osteitis fibrosa such as bone cyst or brown tumor (osteoclastoma). But the picture has changed radically and now, in most large series of hyperparathyroid patients, the skeleton has rarely presented detectable abnormality save as reflected in hypercalcemia. This is undoubtedly due to an increased index of suspicion and awareness of the condition resulting in far earlier diagnosis. *Now* the history of a renal calculus, a recalcitrant peptic ulcer or the finding of an elevated serum calcium by pure serendipity (26) raises the question of differential diagnosis which, for us at least, has become a more difficult matter than it used to be. The skeleton may still present radiological evidence of disorder but only in rare instances is such definitive of hyperparathyroidism. The finding of absent lamina dura about the teeth has proven more likely to lead one astray than to be helpful; indeed in one instance this dental finding led to the discovery of idiopathic *hypo*parathyroidism in a patient who had long been regarded as suffering from a primary mental disorder. Subperiosteal resorption of the phalanges and a curious moth-eaten irregularity at the tips of the clavicles, which may be seen in ordinary chest films, are at times pathognomonic of hyperparathyroidism; but in terms of frequency, these changes are seen much oftener in secondary hyperparathyroidism associated with renal insufficiency than in the primary cases. Indeed the clavicular sign was first described by Friedman in the *Virginia Medical Monthly* in 1952 as characteristic of secondary parathyroidism in chronic Bright's disease (27).

There is nothing really characteristic about the symptomatology which can guide the clinician toward the diagnosis. The majority of patients have ailed in various minor ways for years; indeed most have been labelled hypochondriacs. Some have not been aware of any symptomatic illness, recognizing only after the hyperparathyroidism had been corrected that, by comparison, their well-being was improved.

In all large published series of proven hyperparathyroidism, the incidence of renal calculi is amazingly similar; about 75 percent of the cases either have stones or give history thereof. But sometimes this is merely the passage of a single calculus (usually oxalate) 15 or 20 years before the hyperparathyroidism was identified.

In the past few years more and more of our patients have come to us by way of the gastrointestinal clinic; because of intractable peptic ulcer, a serum calcium determination was made and hypercalcemia found. Though occasionally polyuria and polydypsia are prominent symptoms, suggesting diabetes mellitus, in our series of patients these have been rare even on close questioning by the historian. There are now some 50 patients with recurring attacks of acute pancreatitis, in whom hyperparathyroidism has been found, many with abrupt cessation of the attacks when the parathyroidism has been corrected (28). It seems altogether likely that all of these phenomena—the ulcers, stones, polyuria and pancreatitis—are due to the *hypercalcemia* which accompanies the parathyroidism and not due specifically to the hormone; for we have seen all of them in association with other disease states that induce hypercalcemia.

Differential Diagnosis

All this leads to the confession that, so far as we ourselves are concerned, except in rare instances, the differential diagnosis of hyperparathyroidism is concerned with exclusion

of other causes of hypercalcemia. This negative approach will, in all likelihood, continue until some accurate assay method becomes available to detect the tiny quantities of parathyroid hormone which traverse the blood. For sarcoid, many types of epithelial and mesenchymal malignancies (29) (often with no detectable skeletal metastases), vitamin D intoxication, milk alkali syndrome, or the rare massive skeletal atrophy of disuse, may exhibit hypercalcemia and at some stage also an *hypo*-phosphatemia. It is true that these latter disease states are more likely to present an hyper- or normophosphatemia and normal alkaline phosphatase in the serum, but there is wide overlap and the lines are by no means clear-cut (29).

Tests for phosphate clearance by the kidney are more likely to disclose high clearance in parathyroidism, but again there is wide overlap and it seems unwise to rest one's diagnosis on this criterion alone (22). There must be many factors having influence upon how much inorganic phosphate appears in the urine relative to the concentration in plasma, especially a plethora or lack of phosphorus in the tissues, as so elegantly demonstrated by Yendt (22). We have seen instances of neoplastic disease and hypercalcemia run their course with serum phosphorus consistently below 1 mg. per 100 cc., even when adrenal steroids had brought the calcium down to normal.

Intravenous loading with calcium and following the serum phosphorus response, the urinary phosphorus output and the quantity of injected calcium which is not excreted in the urine during the subsequent 24 hours—this, too, can yield responses in other hypercalcemic states that are indistinguishable from those in patients harboring parathyroid adenomas (18). Cortisone or other adrenal steroids induce prompt return from hyper- to normocalcemia in sarcoidism, and in most patients with cancers, myeloma, D intoxication and milk-alkali syndrome; whereas they do not affect the hypercalcemia in most patients with hyperparathyroidism. However, there have recently been reported two instances in which cortisone did lower the serum calcium in patients who were later shown to harbor active parathyroid adenomas (30) (31).

There are those who criticize us for failure to explore for parathyroid adenoma unless a definitive hypercalcemia is present—a rule which we have invariably followed to date. The basis for this philosophy is very simple. The major evil inflicted by hyperparathyroidism is due to the accompanying hypercalcemia which is, among other things, a serious renal hazard. There are well-known spontaneous remissions and relapses, fluctuations in the activity, as it were, in parathyroid adenomas, some of which are due to spontaneous vascular necroses so common in all types of endocrine tumors (32). We are content to watch and wait, following the serum chemical pattern at periodic intervals, believing no important injury will accrue to the patient in the absence of an elevated serum calcium. One dislikes to ask a surgical colleague to seek a tiny tumor unless reasonably assured that such exists, especially since the mediastinum may have to be opened in the search, and since even in the best of hands an occasional laryngeal nerve palsy may result from the operation. By following such a philosophy, our surgical confreres have found adenomata in 126 explorations, and have failed to find them but six times.

Before leaving the subject of hyperparathyroidism, I shall mention one or two other findings which may be of help in differential diagnosis. Most types of renal failure are accompanied by extracellular acidosis, and the uremia secondary to hyperparathyroidism is no exception. However, it was noted (33) that renal insufficiency secondary to the hypercalcemia of D intoxication (and this holds for most cancers, sarcoid and milk alkali syndrome) is accompanied by an *alkalosis*, elevated serum CO_2 and lowered chloride being almost invariably found—at least relative alkalosis as to what would be expected with uremia of other origin in equiva-

lent severity. In one instance, which I was privileged to see, at University College Hospital in London, where intoxication with D had induced hypercalcemia, alkalosis and mild uremia, a low serum potassium with peripheral nerve paralysis was the presenting complaint. Potassium depletion and intracellular acidosis *may* be the mechanism of this extracellular alkalosis which accompanies hypercalcemia from these causes.

It is also of some interest that in our last 20 hyperparathyroid patients the serum uric acid has been elevated in seven, with no diminution in renal function in other parameters. Following removal of the tumor or tumors, the hyperuricemia fell slightly, but only in those patients in whom it was minimally elevated did it return to normal. Experience of the Georgetown group is similar (34). The significance of this hyperuricemia remains to be explained.

In the presence of renal insufficiency the differential diagnosis between primary and secondary hyperparathyroidism may present a serious problem. If, however, one accepts the dictum that an hyperplastic gland will not continue to over-secrete once the stimulus to such activity has been removed, the diagnosis of primary hyperparathyroidism should not be made unless hypercalcemia is present. A possible exception to this rule would be an hypothetical situation where the hypercalcemia of a parathyroid adenoma has induced renal insufficiency of such a degree that the accompanying hyperphosphatemia has lowered calcium below normal. The other parathyroids would hypertrophy secondarily under these circumstances, and we believe we have seen examples of this; but it must be very rare. Recent reports of subtotal removal of hyperplastic parathyroids to relieve skeletal pain in certain patients with uremia have not given impressive evidence of prolongation of life (35) (36), though bone misery has been alleviated; and we believe this procedure should for the present be regarded as an investigative one.

I should have mentioned before that there is no known way to distinguish clinically the hyperparathyroidism induced by adenomata from that seen in so-called primary idiopathic hyperplasia. For some strange reason, it has not been our privilege to date to meet or recognize a patient with primary parathyroid hyperplasia, though the Massachusetts General Hospital and the Mayo Clinic have each reported quite a few instances (31).

Multiple parathyroid adenomata occur in about 10 per cent of the cases of hyperparathyroidism. Carcinoma is fortunately exceedingly rare (31), for it presents a horrible picture of unrelenting hypercalcemia when it does occur.

Hypoparathyroidism

From the standpoint of chemical changes in the serum, hypoparathyroidism is the mirror image of hyperparathyrodism—i.e., a low serum calcium and elevated serum phosphorus, exception to the latter being when there are other forces afoot to lower serum phosphorus, such as inanition.[6] And like hyperparathyroidism the metabolic disadvantages of hypoparathyroidism appear to lie mainly in the sphere of the disturbed calcium; at least we have never been able to put our fingers on any important harm done by hyperphosphatemia per se. The tetany of hypoparathyroidism behaves like any other hypocalcemic tetany with its carpopedal spasms, convulsions and dementia; and the rare late trophic changes of skin and nails and the cataracts are seen just as in other hypocalcemias.

The nervous system's adjustment to hypocalcemia, in certain instances, seems amazing. We have seen patients 15 years after thyroid operation with well developed cortical cataracts, whose serum calcium concentration

[6] Mr. Edward B. Murphy, one of our graduating class medical students, has recently accumulated convincing evidence that juvenile idiopathic hypoparathyroidism is a disorder of genetic origin, and that traits leading to pernicious anemia and adrenal insufficiency are frequent concurrents. He has also suggested that the susceptibility to fungi may be due to a deficit in a specific serum antibody (37).

we know was 5–6 mg. % ten years before we saw them and had been ignored; yet they denied ever having any previous neurological symptom of tetany. Generalized seizures with carpopedal spasm had brought the condition to medical attention only just before we were consulted.

Albright pointed out that several juvenile hypoparathyroid patients had died of fungal infections, meningeal and evidently septicemia, and suggested that there was unusual susceptibility to fungal invasion—perhaps through the "trophically disturbed" skin.[7]

The differential diagnosis, therefore, lies between hypoparathyroidism and other hypocalcemic states. This is simple enough if tetany has followed upon a procedure on the thyroid; even in the most expert surgical hands the function of the parathyroids is sometimes compromised. But in so-called idiopathic hypoparathyroidism which arises for no visible reason, the diagnosis may not always be so simple and assured.

For practical reasons of expense, pain and the required frequency of injection, the use of parathyroid hormone has just about been abandoned in therapy. Other means must be used to raise the serum calcium or to counteract the tetany. In acute emergencies in the absence of available calcium for intravenous use, it is well to remember that simple saline solution is an acidifying agent, having an ion ratio of sodium to chloride of 1:1 in comparison with 3:2 in the serum. By the small acidification so induced, most instances of tetany can be temporarily controlled by a litre of normal saline. The intravenous use of 10 grams of calcium gluconate, given as 10% solution over several minutes, which provides 1 gram of calcium, will usually be effective for 4 to 6 hours; and intramuscular calcium gluconate, painful and more slowly absorbed, will be equally efficacious. But if the patient can tolerate the dyspeptic qualities of calcium chloride, 5 to 10 cc. of 40% solution of this given in half a glass of water after meals and at bedtime will keep nearly all hypoparathyroid patients free of tetanic manifestations indefinitely. Not only is calcium chloride 40% calcium by weight, but it also induces effective acidosis. We have seen patients who preferred this type of medication and have been on it for 20 years, always running hypocalcemia and reduced serum CO_2 of 15 or so milliequivalents per litre, yet perfectly healthy and without any of the late trophic manifestations associated with hypocalcemic tetany. Other calcium salts such as lactate (far cheaper than the gluconate) are but little effective, though by their use phosphate is precipitated in the gut, hence lowering the serum phosphorus, perhaps thereby rendering the skeleton some slight degree of ease in freeing calcium ions to the extracellular fluids.

While on the subject of oral calcium administration, a recent observation of much interest deserves mention. We had never previously seen exhibition of calcium chloride overshoot the mark and induce hypercalcemia. But this did indeed occur in a tiny lady whose hypoparathyroidism had resulted from total thyroidectomy for cancer. On several occasions with the usual doses of calcium chloride, her serum calcium rose to 17 mg. %, which it did not do on equivalent acidifying doses of ammonium chloride. By virtue of this experience, Dr. William C. Thomas has run a beautiful set of experiments in patients and in rats, showing that the hypothyroid organism is indeed susceptible to hypercalcemia from overdosage with calcium salts. But, by means of radioisotopic calcium, Thomas showed that the hypothyroid rat did not *absorb* more calcium but that the skeleton was unable to exert its usual rapid homeostatic activity (38).

With the introduction of dihydrotachysterol, the hypercalcemic action of intoxicating doses

[7] The term intoxicating dose is used to indicate that such doses given to many normal persons would raise their serum calcium concentration also 3–4 mg. %, which would be seriously intoxicating to them. However, there is enormous variation among normals in their response to these agents, many persons having been said to receive half a million units daily for long periods without hypercalcemia having occurred.

of this and other similar sterols was soon shown to be useful in the therapy of hypoparathyroidism. It has been said that dihydrotachysterol is more efficacious milligram for milligram and faster acting in its hypercalcemic effect than is calciferol. This may be so, but marketed preparations of this material have highly variable quantities of the pure substance in them, and I am told on good authority that a current product has very little indeed. For our own part, we have seen, as has McLean (39), little difference between the effectiveness of vitamin D_2 and AT 10; and since the former is much more readily available and far cheaper, we have used this exclusively for the past 20 years.

The variability in sensitivity to intoxicating doses[7] of these sterols has always amazed us. The hypoparathyroid patient has seemed rather more sensitive to the hypercalcemic properties of vitamin D than are normal persons, for it is rare to find one who does not respond to 300,000 units (7.5 mg.) per day with a 2–3 mg. % calcium rise after 15 to 30 days. The action is almost uniformly delayed, the drugs being of the so-called "cumulative type"; and on their cessation, when one has inadvertently induced hypercalcemia, the return to normocalcemia may require many weeks or even months. This is true, too, of the euparathyroid patient who has been intoxicated with vitamin D.

Adjuvant therapy with oral calcium salts is useful in the sense that lesser doses of vitamin D are needed to achieve the hypercalcemic effect. This seems natural, since one of the known and uniformly agreed actions of vitamin D is to increase calcium absorption from the gut. But the calcium salts are a nuisance; large amounts (20–30 grams calcium lactate or gluconate per day) are needed, and a stirred glassful of the material tastes like soapy flannel. One can gain the desired rise of calcium without them (and the fall in serum phosphorus, too). Oral calcium salts also significantly increase the hypercalciuria which is incident to the use of vitamin D or dihydrotachysterol in these doses (33); and one cannot be guided by the urinary calcium output in regulating the dosage of these sterols.

Once the steady state has been reached and one has achieved a serum calcium of 9.5 mg. % has been induced with, say, 200,000 units (5 mg.) of calciferol per day, the stability of the situation is usually lasting and one can anticipate little change over the years. However, the exceptions to this happy state of affairs are dramatic both ways. For no visible reason, a patient who has been thus well controlled will suddenly develop either hypocalcemic tetany or, on the other hand, hypercalcemic intoxication manifested by itching, vomiting and rapid renal damage with urea retention. Patients and their families must be cautioned to be alert to either of these events. Just as esoterically as the incident arose, it may subside and the patient will resume his previous stable status to the previous dosage level. Our *most* remarkable patient was in excellent health for 10 years on 200,000 units of vitamin D per day, running serum calcium always between 9 and 10 mg. %. A urinary tract infection induced an ammonium-calcium-magnesium-phosphate stone, requiring removal, after which she promptly became intoxicated with serum calcium of 17 mg. %. Cessation of the vitamin D was followed (in two to three weeks) by fall of serum calcium to 9 mg. %, and it has now been nine months that she has taken no vitamin D and serum calcium remains between 9 and 10 mg. %.

Dent has told of an instance in which a patient with hypoparathyroidism well controlled on vitamin D became suddenly apparently insensitive. A switch to comparable doses of dihydrotachysterol was followed by good control, whereas later still vitamin D was found just as effective as it had formerly been (40).

A most fascinating observation has recently been made by Yendt in an hypoparathyroid patient highly resistant to the usual hypercalcemic effect of vitamin D. Administration of magnesium promptly brought about the usual response to the vitamin (41). Far from

the usual, to be sure, but such happenings emphasize how little we know of what we are doing when we administer huge doses of these agents which are, in infinitesimal quantities, natural physiological components.

Pregnancy, too, can affect the stable hypoparathyroid in bizarre fashion. We have seen several pregnancies consummated with no change in the serum calcium at all; but in one patient the requirement of vitamin D doubled during the third trimester; in another patient it decreased sharply. In both these latter, the usual dose was resumed after delivery with excellent results.

Before leaving the subject of therapy with large doses of vitamin D, it may be well to remind you that, when *hypercalcemia* does occur, renal insufficiency is, of course, a likely sequel. But, as previously mentioned, there is the most remarkable and quite uniform finding of extracellular alkalosis (33)—a most unusual occurrence in usual uremic states.

When hypoparathyroidism is observed to follow abruptly on thyroid surgery, it is wise, we believe, to temporize with full restoration to normocalcemia in the hope that slight hypocalcemia, following Halsted's law, will result in stimulus for the remaining parathyroid tissue to hypertrophy and compensate. There is always the possibility, too, that the glands may not have been removed but only temporarily injured or their blood supply interfered with.

Now as to why hypoparathyroidism sometimes appears out of a clear sky and as to the nature of what pseudohypoparathyroidism is, or pseudo-pseudo, I have little idea. In this day of the vogue of the concept of hypersensitivity to one's self, this notion has, of course, been advanced. Autopsy or biopsy descriptions of the parathyroid glands in these conditions are deplorably few, and those available seem to show widely divergent findings, from no tissue to fatty unfiltrated to normal.

That pseudo- and pseudo-pseudohypoparathyroidism are hereditarily transmitted states seems to be well established. The curious physical stigmata, complete or incomplete, of short stature, round face, missing metatarsal bones giving the curious hand pattern, vicarious calcification, lens changes and the like seem to me far commoner *without* chemical evidence of parathyroid disturbance than with it. And, being of skeptical turn of mind, I've always wondered if these pseudohypoparathyroid patients were really pseudo and not real. When I was working with Ellsworth, the intravenous use of 200 units (current standards) of parathyroid extract produced in hypoparathyroid persons enormous changes in urinary phosphorus output. But our patients were on, and had been on for long periods, huge doses of oral calcium (by necessity for we had no other therapy) and low phosphorus diets to boot, so that their total daily absorption of phosphorus must have been well nigh nil; and their urinary phosphorus was negligible. Yendt (22) has shown that low phosphorus diets will reduce urinary phosphorus to zero even in patients harboring active parathyroid adenomas and that in such patients intravenous parathyroid hormone will result in prompt and dramatic outpouring of phosphorus in the urine. This can only mean that parathyroid hormone is but one, and a minor one at that, of the factors determining how much phosphorus comes out in the urine under any given set of conditions. It may be, and I am anxious to have the thesis tested, that pseudohypoparathyroid patients will show phosphorus diuresis if the conditions of the experiment are those of phosphorus depletion. But as of now I cannot gainsay the end-organ insensitivity theory proposed by Albright, when he labelled a simple physiologic observation the Ellsworth-Howard test (21) and made it the criterion for the diagnosis of pseudohypoparathyroidism.

Regardless of the mechanism of the altered metabolic situation, pseudo-, idiopathic and surgical hypoparathyroidism respond in the same way to our therapeutic efforts to maintain the serum calcium within normal range.

This has been a rather panoramic view that has been sketched as to what may happen

when things go awry in the parathyroid glands. I hope that it has not served to confuse rather than to clarify an approach to these problems which are today quite commonly faced by the medical practitioner.

It has been a pleasure to be with you and, I assure you, a deeply-felt honor.

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Some Experiences with Chinese Drugs[1]

By CARL F. SCHMIDT, M.D.[2]

FORTY years have passed since my wife and I arrived in China and had our first contact with that strangely disturbing, yet appealing land. At that time I had been in the Department of Pharmacology at Pennsylvania for three years, during which I was an instructor in the student laboratory exercises in both pharmacodynamics and materia medica. As I look back, I wonder what would have happened if we had not then tried to give the medical students some practical experience in the physical and chemical properties of drugs and the methods involved in separating active principles from vegetable preparations. Certainly I would have had a different set of experiences and would probably have returned from China to follow my original intention of practicing medicine, not to a career in pharmacology and an invitation to give the Kate Hurd Mead Lecture.

What happened was this: when, after some hesitation, we finally decided to accept an invitation to go to Peking for two years, it was understood that the first year was to be spent at work with Dr. Bernard E. Read, head of the Department of Pharmacology in the Peking Union Medical College, the new medical center which the Rockefeller Foundation had opened just a year previously. At the end of my first year there, Read was to go on sabbatical leave and Dr. Reid Hunt, Professor of Pharmacology at Harvard, and one of the world's outstanding figures in pharmacology, was to be there as Visiting Professor.

Actually, Dr. and Mrs. Hunt arrived in Peking a few weeks after we did, a year earlier than the Reads and we expected them. The Reads then made a rapid readjustment of plans and left on their sabbatical a year earlier than they had anticipated. Before he left, however, Read told me something about his plans for investigating Chinese materia medica and gave me some suggestions based on a unique experience. He had been born in China and trained in pharmacy and after his appointment to the chair of pharmacology in the new Rockefeller school in Peking, he spent a large amount of time and effort in studying the Chinese sources of information about native drugs. The culmination of these studies was a series of interviews with prominent Chinese practitioners, during which he became familiar with their ideas. By the time he left Peking in the autumn of 1922 he had compiled a list of favorite prescriptions and had arrived at an idea of where one might begin an investigation of Chinese drugs with some prospect of success.

Here I must digress from my story to sketch the background of research in the pharmacology of Chinese drugs as it existed in Peking when we arrived in July, 1922. The new hospital and laboratories of the Peking Union Medical College had been opened just a year before, at a cost of nearly 20 million U.S. dollars. The idea was to build up a new, small group of young Chinese medical scientists by providing unsurpassed facilities, adequate resources and equipment, a staff of carefully chosen teachers and researchers (including distinguished visiting professors from all over the world), and an atmosphere of scholarly, scientific interest both in the care of the sick and in the advancement of knowledge. In the volume containing the addresses delivered at the dedication, in September 1921, are a number of allusions to the probability that the long experience of the Chinese with drugs must have given them some items

[1] Kate Hurd Mead Lecture in Medical History XIV, Woman's Medical College of Pennsylvania, College of Physicians of Philadelphia, 27 March 1962.

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of unparalleled value to the rest of the world, and an earnest, dedicated man like Bernard Read was bound to sense here a challenge to his new department of pharmacology.

The Chinese Dispensatory (the P'en Tsao) had its first edition in B. C. 2760, when Emperor Shen Nung, revered as the father of Chinese agriculture, compiled a list of 358 drugs, of which he is said to have personally tested 100 and recorded his impressions. It is perhaps noteworthy that of the 358 drugs in the first edition of the P'en Tsao, 40 were of mineral origin, 68 came from animals, and 250 from plants. When I first heard about these things in 1922, the current edition of the P'en Tsao was the 26th revision, compiled by Li Shih Chen in A.D. 1597. This contains a total of 799 plants, many of which at that time had not been identified but all of which were supposed to have special virtues.

I think it is no exaggeration to say that practically all the foreigners who came to work in the medical schools in China in those days were impelled by a genuine desire to help the Chinese, but they also expected to learn something from the Chinese experience. Nowhere else in the world was there a continuous civilization over a period of almost 5000 years without serious interruption. Nowhere else was medicine separated at such an early stage from the supernatural and allowed to follow its course unhampered by the organized priesthood. Nowhere was learning of every sort more highly esteemed, and particularly so when it involved written records. And nowhere were the people more intelligent, more industrious, and (in their own peculiar way) more honest. Having learned some little of this before we arrived in China, I anticipated some startling discoveries among Chinese drugs.

My expectations were further enhanced by the then-recent introduction of chaulmoogra preparations to treat leprosy. These preparations were scarce and expensive and to supply the foreign physicians in the Far East a small manufacturing plant had been set up in the basement of the Physiology-Pharmacology Building to make ethyl esters of chaulmoogra. I saw numerous letters from physicians asking for larger shipments or greater speed, and some of them expressed the conviction that chaulmoogra preparations certainly produced prolonged remissions if not actual cures. Chaulmoogra was used by the Chinese to treat leprosy for centuries, and one of the names for the source of the oil means literally Leprosy Seed. When I learned more about Chinese customs I was a little disturbed to find that in China chaulmoogra is customarily boiled until the limpid oil becomes a dark, tarry mass (thereby certainly saturating the unsaturated bonds on which its activity depends). Then it is taken by mouth, a route by which even the most active preparations are ineffective. I wondered then how the tradition of the use of chaulmoogra began, and what subsequent generations had done to it, but I had no doubts about this being an example of the things we might learn to our advantage from Chinese Materia Medica.

When Read decided to leave a year earlier than he had planned, he told me as much as he could about the results of his readings and conversations about promising Chinese drugs. As a starting point he had listed the drugs in the order of the frequency with which they appeared in famous Chinese prescriptions. He then compared this rating of importance with conversations with Chinese practitioners and came up with the startling news that four drugs stood far ahead of the others, namely licorice, deer's horn, rhubarb and ginseng. All these had already been thoroughly studied in Germany, Japan and elsewhere, and did not seem to deserve our further attention. The next on the list was a substance known as T'ang Kuei (*Angelica Polymorpha*), which was said to be very effective in the treatment of menstrual and puerperal disorders as well as in increasing fertility—a matter of some importance in gaining favor in a family including several wives. Read procured a supply of this material and then left for his sabbatical year.

I did my rather poor best to isolate definite

active principles from T'ang Kuei, without success (1). At one time I got a bunch of crystals out of a purified extract and was elated to find that they stimulated the uterus in vitro and in vivo. Unfortunately, I was never able to repeat this performance with other extracts and I concluded that the crystals must have been a contaminant. Extracts of the drug unquestionably could irritate the intestinal tract and I finally concluded that the virtues of this famous remedy were like those of parsley, sage and other emmenagogue oils.

The second drug on Read's list was a nerve medicine known as Fu Ling. This apparently was a dried white fungus, devoid of odor and taste. Again I was unable to find an active principle and this time I could find no trace of a distinct action of any kind.

Meanwhile I had had my first experience with Chinese medical students and found them prodigious in industry and memory but greatly lacking in originality, reasoning power and technical skill. After our first progress test I determined to change the entire program so as to emphasize experimental problems for which they could not find answers in books. After the first wave of helplessness, the students began to get the idea and we had a good time together. These activities precluded work on Chinese drugs until the teaching season ended. We did, however, make some studies of poisoning by false (bastard) anise, which is occasionally seen in children who swallow the contents of a bag in which anise seeds are suspended in a boiling pot to season the food. True anise is not poisonous, but false anise causes violent and often fatal convulsions. False anise looks, tastes and smells much like the real article and is much cheaper—a situation which the eminently practical Chinese merchants found irresistible, and perhaps still do. We found that poisoning could be prevented by washing the stomach with a mild alkali, such as sodium bicarbonate, but were unable to isolate the active principle.

About this time, when my early enthusiasm over great discoveries in Chinese drugs had weakened considerably, Dr. Victor Heiser came to Peking on his annual visit as president of the International Health Board of the Rockefeller Foundation. He spent some time in our laboratory and I told him of our disillusioning experience with two famous Chinese drugs. That evening there was a dinner in his honor and next to him was seated an elderly Chinese diplomat then living in retirement in Peking after a long career in England and America. As I got the story afterward, Heiser told this Chinese gentleman about my discouraging findings, whereupon the latter told him that I should have a look at Huang Chi.

It appeared that, some twenty years previously, the Chinese diplomat while on vacation in Peking fell ill with intolerable headaches and uncontrollable vomiting. Being thoroughly convinced of the superiority of Western medicine, he asked to be cared for by foreign doctors, of whom the best in Peking then were the Germans. He was taken to the German Hospital in the Legation Quarter where he was studied by the best procedures available. The diagnosis was chronic nephritis with uremia and he was given a completely unfavorable prognosis.

The Western doctors had nothing to offer by way of treatment, and the Chinese gentleman and his family therefore decided that he might as well die with Chinese drugs as with none at all. They therefore called in a prominent Chinese physician who treated him with Huang Chi. He made an uneventful recovery and was hale and hearty when Heiser sat beside him at dinner about twenty years later.

I therefore got some Huang Chi (*Astragalus Hoangtchy*) and again looked for an active principle without success. Animals treated with various extracts of the drug displayed no identifiable pharmacologic pattern and I was unable to find any evidence that the drug did anything at all (2).

This was one of my first encounters with the problem of knowing when to stop. Ordinarily, I would have felt justified in dropping such a study unless I thought the reasons for follow-

ing the native tradition were particularly strong. Here, however, we seemed to have valid evidence from intelligent people, and I had to decide whether to discount the evidence on the grounds of faulty diagnosis or spontaneous cure, or to look into this drug more deeply in nephropathic as well as normal animals.

While I was trying to decide what to do I was told that a young Chinese who was about to get a Ph.D. in alkaloidal chemistry at the University of Wisconsin was interested in coming to Peking to work in pharmacology. This young man, K. K. Chen, had made a brilliant record at Wisconsin and seemed to be exactly the sort of person whose presence in Peking was urgently desired. In an exchange of letters I told Chen about my disappointment over Chinese drugs but I expressed a desire to go on further, counting heavily on his help.

Chen came to China in the summer of 1923 and stopped over in Shanghai to visit his family. In one of the family gatherings he apparently told of my lack of success in finding definite actions in famous Chinese drugs, and an uncle who owned a Chinese pharmacy told him to tell me to look into Ma Huang, a drug which the uncle knew from personal experience to have real actions. Chen found out all he could about Ma Huang and got a small supply of the drug to take with him to Peking.

When he arrived I had begun a series of practice experiments for the student course, intending not be caught again in the hasty replanning of the previous year. He told me about Ma Huang but I was too preoccupied with more important matters to pay much attention. Probably by that time I was no longer believing much that I heard from Chinese about Chinese drugs. A few days later, however, we came to the end of a practice experiment on a dog and since the animal was still in good condition I asked Chen if he wanted to use it. He suggested that we try Ma Huang, and after he had refreshed my memory, he made an extemporaneous decoction (boiling water extract) of some of the Ma Huang he had brought from Shanghai. After cooling the straw-colored liquid he put some of it in a 10 cc. syringe and I injected about half of this solution intravenously in the dog.

By this time I had given hundreds of crude drug extracts intravenously in animals and had always seen a sharp fall in blood pressure. This time, however, the blood pressure rose steeply, and at the same time the volume of the kidney fell sharply. This was the same picture we had seen earlier in this and other animals on intravenous injections of epinephrine, and my first impulse was to ask Chen if he was sure there had been no epinephrine in the syringe. He indignantly denied any such infraction of elementary experimental regulations and when we looked at the kymographic record it was obvious that we were not dealing with epinephrine: about five minutes after the injection blood pressure was still rising and the initial fall in kidney volume had given way to a marked increase.

Obviously, we had stumbled on something out of the ordinary, and I suggested that Chen drop everything else to see what he could do by way of isolating an active principle from Ma Huang. Within three days he came up with a crystalline alkaloid, and as soon as he could get enough for animal experiments we went on to study its actions. At first we thought it might be a cocaine-like substance because it produced violent convulsions in mice, mydriasis and exophthalmos in rats and rabbits. It soon was evident, however, that our alkaloid had no local anesthetic properties and the pattern of its action was almost perfectly sympathomimetic. We found that, unlike epinephrine, our material was absorbed from the intestinal tracts of animals and men. We tried it in asthmatic patients and found it active. It even raised blood pressure in a patient in surgical shock (3).

Only when we had practically finished our work did we learn that this alkaloid had been isolated by a Japanese chemist Nagai in 1887 and named ephedrine after the botanical

name for Ma Huang (*Ephedra Vulgaris*). It is not without interest that Nagai's ephedrine was turned over to a senior medical student named Miura, who evidently injected a very large dose intravenously in an unanesthetized dog. The result was violent excitement, convulsions and death, before which the pupils were widely dilated. As a result of these, the only observations on its actions, ephedrine was classified as a toxic mydriatic. Between 1890 and 1893 it had a brief vogue in Germany and America as a mydriatic but apparently no further use was made of it and when, as a result of our work in 1924, there was a world-wide demand for it, Merck found a bottle of ephedrine hydrochloride on their shelves in Darmstadt, where it had passed unnoticed for about thirty years. One final interesting point: ephedrine was discovered in 1887, whereas the actions of epinephrine were first described in 1893 (4). When ephedrine came into therapeutic use in 1924 it was as a vegetable supplement or replacement for epinephrine. If Miura had used smaller doses of ephedrine in 1887, or if the head of his department had not been so preoccupied with other more important matters, epinephrine would have come in as an ephedrine-like substance found in the suprarenal glands of animals.

Our report on the pharmacology of ephedrine was compiled before I left Peking in June, 1924, and was published in October. We expected that the appearance of this paper would cause something of a stir, not only because of the dramatic circumstances (confirmation in China of the Chinese traditions about one of their ancient drugs), but also because ephedrine bade fair to find a unique place in therapeutics. For one thing, it offered promise of an epinephrine-like effect in bronchial asthma from a drug taken by mouth. Furthermore, one of our colleagues in the Department of Otolaryngology in Peking had suggested that ephedrine might be useful to shrink engorged nasal mucous membranes, and had found it very effective. At the time the only agent in use for this purpose was cocaine; epinephrine was irritating and the shrinkage produced by its local application was followed by worse engorgement than before. At the time we were totally unprepared for the popularity which the local actions in the nose were going to find, but we thought it likely that there would be some demand for the new drug. Therefore we organized a small enterprise for preparing ephedrine salts from Ma Huang. This was done in the same laboratory that had been set up to make ethyl esters of chaulmoogra and that subsequently had taken on the preparation of colloidal antimony sulfide (to treat kala-azar) and of glass-distilled water (to dissolve and dilute arsenobenzol derivatives for the treatment of syphilis and yaws). When I left Peking in June, 1924, I brought with me 100 grams of ephedrine sulfate which was practically all there was in the world at that time. The laboratory was to go on with the preparation of more, to be sent to such places as Chen and I might designate.

When I reached Philadelphia one of the first steps was to tell Dr. Richards the story. It had been agreed among the interested parties (Chen, Dr. Henry Houghton, the Director of the Peking Union Medical College, and myself) that ephedrine was to be Chen's major interest and that I would participate only on special invitation. It had also been agreed that the next step was a controlled clinical study in a recognized American medical center and I was authorized to arrange for this. Dr. Richards and I both were old friends and admirers of Dr. T. Grier Miller, and we therefore asked him to undertake the task. I told him all I could about ephedrine and turned over to him the supply I had brought with me.

The appearance of Miller's report early in 1925 (5), precipitated a deluge of requests for ephedrine far beyond our greatest expectations. To save us from personal involvement we arranged to have the entire output of the Peking manufacturing laboratory turned over to an old Philadelphia pharmacist, Frank B. Morgan, then near 17th and Walnut and now in the John Wanamaker Store. We sent all requests for ephedrine to Morgan, who

filled them in the order of receipt and took care of all the financial aspects. The only money Chen and I ever got out of ephedrine was a shared royalty (about $100.) on a monograph we wrote on the subject for Medicine in 1926.

Meanwhile, pharmaceutical companies all over the world were becoming interested and one American concern was enterprising enough to buy up all the Ma Huang available in the Orient. This impelled other companies to seek for other sources of this potentially valuable commodity, and since the structural formula of ephedrine was well known, a number of attempts were made to produce it synthetically. It was a natural step to test the properties of related compounds that were easier to make, and within the next five years a series of such agents appeared on the market. Practically all of the ephedrine now in use is made synthetically. Of greater importance, however, is the fact that we now have a variety of compounds related to ephedrine but possessing different patterns of activity. It is unquestionably true that our work on ephedrine was the trigger mechanism for this development.

As I look back I realize that Chen and I had the unusual privilege of coming on the scene early in the transition from ancient tradition-ridden Materia Medica to modern therapy by effective doses of pure agents with definite pharmacologic properties. Departments of pharmacology were then newcomers in medical centers and had not yet made much of an impression on patterns of drug-giving. Pharmaceutical manufacturers were interested almost exclusively in processing drugs already in use and had not yet set up programs of research in pharmacology. The introduction of insulin in 1922 was the first of a series of new and valuable drugs, discovered in research laboratories. Our announcement of ephedrine in 1924 was another. Since then there has been a continuous series of new drugs of unprecedented and often unique value, such as the mercurial diuretics, the non-narcotic anticonvulsants, peripherally and centrally acting relaxants, synthetic adrenergic and ganglion blocking agents, the sex and adrenal steroids, the clinically useful anticoagulants, the antihistaminics, varieties of local and general anesthetics, the sulfonamides and antibiotics, the synthetic antidiabetic agents, and more recently the tranquilizers, the orally effective potent diuretics, and the monamine oxidase inhibitors. All these, and others like them, without exception were introduced into therapeutics by way of experimental laboratories, and all of them were synthetic products except the alkaloids of curare, veratrum and rauwolfia.

This trend away from natural products and toward the output of synthetic laboratories began early in the twentieth century and has been steadily increasing. In 1916, almost 80 percent of the drugs in use in this country were derived from plants, the remaining 20 percent being made up equally of pure inorganic and organic synthetic chemicals. By 1955, the plant products had fallen to 30 percent of the total, the inorganic chemicals had increased to 20 percent, and the synthetic organic products had risen to 50 percent. If the lines connecting these points are projected into the future, drugs of vegetable origin will pass completely out of use in 1978, when organic chemicals will represent 75 percent of the drugs in use and inorganic chemicals will account for the remainder.

Obviously, such exercises in extrapolation have no value except to indicate a trend. There is no immediate prospect of synthetic replacements for the antibiotics, the cardiotonic glycosides, and for alkaloids such as colchicine, emetine, pilocarpine, and the alkaloids of belladonna, cinchona, veratrum and rauwolfia. Furthermore, they make no provision for the introduction of naturally occurring agents such as chaulmoogra, ephedrine and the rauwolfia alkaloids. Each of these appeared at the time as a triumphant vindication of local traditions of long standing and each served as a trigger mechanism for great activities both in the search for other natural

products of unique value and in the synthesis of similar agents in the laboratory.

In all these developments the one common denominator was the experimental laboratory. All of the new agents introduced into the therapeutics in the past fifty years, with one exception, have come through the laboratory, and the quantity and quality of these agents bespeak the quantity and quality of the effort in the laboratories.

The exception is chaulmoogra, which was tested only for toxicity before it was introduced to treat leprosy in man. I mentioned earlier my uncertainties about chaulmoogra because the Chinese would first inactivate it and then take it by mouth, a route by which even the most active preparations were ineffective. This problem eventually was solved when I visited a leprosarium at Tala near Manila, in 1955, and was told by the experienced and dedicated Filipino leprologists that chaulmoogra never was effective in human leprosy, except for a minor action when applied locally.

Many of the major drug manufacturing companies in this country and in Europe have for years been maintaining a continuous search for new natural sources of valuable drugs. I know that some of these groups have found numbers of active substances and I suspect that all of them have had similar experiences. But since the introduction of Rauwolfia alkaloids about 10 years ago, no new drugs of natural origin have been introduced into therapeutics. This can only mean that the natural products do not have enough advantages over existing agents or synthetic counterparts to justify their promotion. There are problems of procurement, identification, transportation, purification, deterioration and validation in natural products that do not exist with synthetic compounds, and the former must have real advantages over the latter to justify the effort and expense of introduction. In a Communist society, such considerations do not prevail and this may explain why the Chinese now are requiring all physicians to take special courses in traditional Chinese medicine. It is ironic that one of the centers for such instruction is the Peking Union Medical College. Perhaps one of the results will be the discovery that I was entirely wrong about Tang Kuei, Fu Ling, and Huang Chi.

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Chronic Middle Ear Disease and Its Management, *and*, The Surgical Transition in the Treatment of Otosclerosis[1]

By PHILIP E. MELTZER, M.D.[2]

IT IS so easy for honored names to pass from the minds and memories of men. It is therefore highly fitting that the names and accomplishments of these great men be perpetuated in such a manner as a memorial lecture.

It is regrettable indeed that the younger men and residents believe that the newer concepts in otology are the innovations of their contemporary teachers, whereas, in fact, there are but few ideas in present-day otology that are not based on the teachings of their predecessors. Our idea leads to another, and it is only reasonable that the more recent ones should be in vogue.

At the turn of this century, the three great centers in the teaching of otology were Philadelphia, New York, and Boston, but only Philadelphia can claim Dr. Coates. Dr. Coates carried on the highest traditions of his city's cultural and scientific heritage. This man whose memory we honor tonight was brought up in the era when a profound knowledge of anatomy, symptomatology, and differential diagnosis was of paramount importance so that the indicated surgery to control the ravages of otitic disease could be performed. These men did not have the benefit of chemotherapy and antibiotics to assist them—aids which so many of the present-day otologists depend on to make up their own deficiencies in the basic requirements for good surgical practice.

I can say with the greatest conviction that Dr. Coates truly exemplified the most admirable traits that any person can have. His friendliness and sincerity were genuine, and he exhibited absolute freedom from prejudice of any kind. He was always eager to provide other persons with opportunities for self-expression. He was completely above any feeling of animosity. He had a quiet and gentle air of authority which commanded admiration and respect. His smile reflected the warmth and radiance of his endearing personality. He was, indeed, a man who exists but rarely among us, but a man for whom the world has a desperate need.

I especially appreciate this honor of presenting this memorial lecture because of what Dr. Coates meant to me personally. Were it not for him, my interest in otology might have been directed in an entirely different channel.

I must relate the incident that turned out to be so important in my personal happiness. In December of 1937, Dr. Coates was the guest speaker at the Annual Meeting of the New England Oto-Laryngological Society. As Secretary, I took him in charge. In the course of our conversation he casually asked if I knew Dr. Lempert, of New York. I replied that I had read one article years ago on subcortical mastoidectomy and was not one bit impressed. Dr. Coates remarked that he had seen Dr. Lempert operate to improve hearing in a patient with otosclerosis and had never before witnessed such skillful technique. Dr. Coates actually insisted on making arrangements for me to visit Dr. Lempert, which he did. In the early

[1] First George M. Coates Memorial Lecture. Read before the joint meeting of the Philadelphia Laryngological Society and the Section on Otolaryngology, College of Physicians of Philadelphia, 6 February 1962.

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spring of 1938, I flew to Newark, where Dr. Lempert met me and took me to his office at 119 East 74th Street. He had a patient all prepared for me to examine and test her hearing. Later that day he had me scrub to better observe his operation. As Director of the Graduate Course at Harvard Medical School in temporal-bone surgery for ten years prior to our meeting, I thought I knew how to dissect a temporal bone, but, after watching Dr. Lempert operate, I felt like a novice. It was simply an amazing exhibition of skillful handling of instruments and exposure of anatomy. Thus began my interest in the fenestration operation and other endaural techniques which led to the establishment of the Frederic Winthrop Foundation for the Study of Deafness at the Massachusetts Eye and Ear Infirmary, which I headed for sixteen years. You can now understand why I relate this incident and why I am one of the many men who will be forever gratefully indebted to Dr. Coates for his wise counseling, just as many of you in this audience are eternally grateful to him for the opportunities afforded you.

The fortunate circumstance of Dr. Coates's longevity enabled him not only to observe the progress of otology, but to participate in this progress up to his very last moments. He saw the beginnings of neuro-otology, labyrinthine physiology, audiology, and the development of the surgical procedures for the improvement of hearing in otosclerosis and the chronically discharging ear.

In my discussion this evening I shall take for my theme some of the subjects in which Dr. Coates was vitally interested and which he presented before this society on November 16, 1932. At that time, he reviewed some of the recent developments in the study of otosclerosis, the static labyrinth, and the surgery of the chronically discharging ear. In his presentation he mentioned that Nager, of Zurich, showed sections illustrating the degenerative changes in the neural structures, indicating that otosclerosis not only produces an interference with sound conduction but induces degenerative changes in the spiral-ganglion cells, as well. This observation was verified by A. A. Gray, of London. Sensorineural deafness is a condition not infrequently occurring in otosclerosis and still remains an enigma.

There are some otologists who hold firmly to the belief that early and rapid deterioration of the high tones, frequently seen in malignant otosclerosis or as a late development in the course of the disease, is due to a toxin liberated in the endolymph through the stria vascularis. The organ of Corti in the basal turn of the cochlea seems to be the most vulnerable area. Be that as it may, the frequency of the high-tone loss in otosclerosis is certainly a disconcerting fact. As this question is no nearer solution than it was in 1932 when Dr. Coates brought it to your attention, I shall leave it for others to ponder over.

The medical treatment for otosclerosis ran the gamut on nonsensical, shameful therapy by charlatans and the most ethical practitioners of the day. You must remember that by this time, 1932, the pathological changes were fully known and the irreversibility was acknowledged, and yet doctors continued with medical therapy.

The contributions of Boucheron, Miot, and others had long since been forgotten, having received their death blows by the powerful hierarchy of the 1900s, and, by 1932, American otologists were not a bit more enthusiastic about the later contributions of Barany, Jenkins, Holmgren, and Sourdille. Otosclerosis was most commonly misdiagnosed as chronic nonsuppurative otitis media or chronic catarrhal deafness, despite the admonitions of that great otologist, Dr. George Shambaugh, Sr.

Sourdille's presentation before the New York Academy of Medicine, Section of Otology, in the early 1930s was a masterpiece of ingenuity. His three-stage fenestration operation defeated itself as a practical procedure, but the idea of providing a protective covering for the fenestra and exteriorizing the epitympanic structures did catch on.

Lempert, long before, had read Sourdille's article, published in French. Well, you all

know the rest of the story. The endaural incisions of Lempert used so successfully by him for his tympanoatticomastoidectomy—or the radical mastoidectomy, as it is commonly known—were ideally suited, not only for the exteriorization of the epitympanum but also for the provision of a nourished graft to cover the fenestra, and were performed in one stage. In this period of 1938 to 1940, when many people frankly believed that otology as a surgical specialty was on its way out, a rebirth of interest occurred with the development of the Lempert procedures, which included brilliant illumination and magnification as adjuncts to this meticulous surgery.

Here again, I must refer to Dr. Coates, for it was he who recognized not only Dr. Lempert's skill as a surgeon but approved the logic of the fenestration operation, which mobilized the perilymph once again, that it might carry sound waves to the cochlea. Dr. Coates, as Editor of the *Archives of Otolaryngology*, allowed publication of Dr. Lempert's article, thereby bringing to the attention of otologists throughout the world a procedure which otherwise might have languished for lack of publicity. What a wonderful feeling it must have been for Dr. Coates to have seen otology revived with a vigor that had the skeptics gasping.

As the years went by, the early astounding acceptance of the fenestration operation gave way to indifference on the part of many otologists. The technical skill involved limited its general usefulness. Most otologists were perfectly willing to let a comparatively few men take over their patients. The hearing improvement was good, but always limited. The morbidity was considerable, and, too often, the breakdown of the epithelial lining of the mastoid cavity, with superimposed infection, caused great annoyance to patient and surgeon. Although a few patients submitted to bilateral fenestration, most would not go through a second procedure, regardless of the improvement in the operated ear. At this time, it must be remembered, the Lempert fenestration was the only operation known to improve hearing in otosclerosis. It is an operation rarely performed today. We cannot just stop at this point and bury it; it has greater significance. Those who were trained in its performance were far better surgeons because of such training. These men are the foundation for those of you who are unfamiliar with the fenestration operation and who think that tympanoplasties and the stapes procedures were developed without it. The names of Campbell, Ronis, and Myers, in this city, and Moorhead, Kos, Rambo, House, Shambaugh, Derlacki, Juers, Goodhill, Rosen, Williams, Sullivan, Lindsay, Boies, Hoople, Maxwell, and Bellucci come to mind as some of those otologists who learned from the ground up the endaural techniques for temporal-bone surgery at the Lempert Institute. The fenestration operation and other endaural procedures—even the defunct tympanosympathectomy—are all significantly important in the development of this newer concept of management of otosclerosis and the chronically discharging ear.

Moving onward with the theme of otosclerosis, we now come to the fortuitous event which, like the Lempert fenestration in the 1940s, was again a transfusion in the management of otosclerosis—namely, the revival by Dr. Samuel Rosen of the long-forgotten, but still the most beautifully described of all procedures—the stapes mobilization of Miot. In the course of testing the stapes to determine its fixation, Dr. Rosen accidentally mobilized it, with the results that the patient spontaneously heard normal sound for the first time in many years. The most important thing of all in this happy event was that Dr. Rosen recognized what had happened. In his published paper, he suggested that mobilization of the stapes might be a direct method of improving the hearing in otosclerosis. At that time he evidently was completely unaware of the publications of Boucheron and Miot.

You are familiar with the course of events that followed: hearing improvement in many patients reached a normal level and was often maintained, but, in the majority, the improve-

ment gradually receded, partially or completely, indicating complete or partial refixation of the footplate.

As time went on, technical skills improved. The antibiotics allayed the fear of infection, and surgeons began to attack the footplate more boldly. Then came the astoundingly fresh approach to the stapes problem, namely, stapedectomy with replacement of a protective tissue in the oval window and a connecting strut of polyethylene, thereby reconstituting the transformer mechanism of the middle ear. This contribution by Dr. John Shea climaxes the surgical procedures for the improvement of hearing in otosclerosis. The numerous modifications of technique and use of other tissues need not be dwelt on at this time, except to say that it would appear from the statistical reports that vein or fat, with wire or polyethylene tube as a strut, gives equally good results. There are so many modifications that I shall not enumerate them. All I can say is, "Why complicate the operation?" The technique that will and should prevail is the one that is simplest and can be learned by reasonably able surgeons. At the moment, the techniques of Shea and Schuknecht appear to be the best.

It was unfortunate that the impression was given by many otologists that simple stapes mobilization was a harmless procedure, that it could easily be performed, and required limited training. It was stated that if the hearing improvement receded, the operation could be repeated, not once but many times. This resulted in innumerable accidents which were rarely reported, and, in many patients, the hearing was worsened. As manipulations to the footplate were extended, the trauma to the endolymphatic structures resulted in prolonged vertigo and, not infrequently, total loss of hearing. The only things needed, as far as many otolaryngologists were concerned, were nerve, instruments, and a microscope. It would appear that these men borrowed a byline from a television character: "Have microscope, will operate!"

I have a feeling that were it not for the contributions of Dr. John Shea, with modifications by Drs. Schuknecht, Portmann, and others, the simple stapes mobilization of Rosen would have had limited usefulness.

Stapedectomy has, without a doubt, restored hearing more lastingly in a greater number of patients than has any operative procedure heretofore advocated. Regardless of which of the several stapedectomy procedures one elects to practice, this is a technical procedure fraught with consequences that every man must be prepared to meet and try to overcome.

While in Toronto last year, I heard a paper read by Dr. G. A. Fee. He was kind enough to give me permission to paraphrase some of his statements. He says, so wisely, that although it may be more satisfying to dwell on the large number of excellent results from stapedectomy, it certainly is more profitable to discuss complications and how to avoid them. One should not proceed from experience on a few cadavers directly to the stapes in a living patient. Residents should first be thoroughly trained in incisions and how to reflect the canal-wall membrane, and then they will have the benefit of a step-by-step progression to the footplate.

When one considers the variation in the size of the external auditory meatus and the difference in the diameter and the incline plane of the osseous canal which completely obscures the incus, thereby requiring extensive removal of bone so that the structures can be seen, one shudders to think of what the novice must contend with, especially since difficulties such as these have to be contended with before the footplate is even seen. Even after the surgeon has exposed the stapes, the following other anatomical difficulties now appear: the facial nerve may overlie the fossa dangerously; the fossa ovalis may be so narrow that the entire space is filled by the crura; and the otosclerotic growth may have so infiltrated the footplate and the crura that there is no line of demarcation. One should then realize that this operation is a highly technical procedure requiring a specialized training, and is not the operation to be performed by the surgeon who has an

occasional patient with otosclerosis. To develop competence to cope with these anatomical variations and give the patient the best care, one should be in a position which affords him the opportunity to acquire the necessary skill.

Postoperative reactions must also be kept in mind. There are some patients who are more susceptible to the trauma of this operation, particularly those who show evidence of high-tone loss before operation or those who have dizziness after a simple stapes mobilization. In such patients, the hearing is likely to be made worse. It is difficult for me to understand why ideally suited patients, after stapedectomy, have practically no high-frequency loss, whereas others, operated on with comparable technique with minimal trauma, have a rather severe loss. Although many of these patients with such losses show improvement with time, many do not. It has been suggested that these losses are the result of sudden compression of the perilymph due to manipulations in removing the footplate, or, possibly, compression of the perilymph when a fat graft or vein graft is inserted too deeply in the oval window. Dr. Fee believes that depletion of the perilymph by repeated suction may cause high-frequency loss. Bleeding into the perilymph space, which is completely unavoidable in many cases, may result in some damage to the basal turn, although I believe that the blood is usually completely absorbed. Traumatic labyrinthitis is probably one of the most common causes of high-frequency loss. Infection, in my opinion, is not common, and, when it does occur, it results in very serious damage to the inner ear.

In Miot's original article, wherein he so aptly described every possible postoperative symptom, and which no one to this day has ever improved upon as regards detail during and after operation, he mentions the effect of cutting the chorda tympani nerve. I, too, find that this is frequently very distressing to the patients, and they constantly remind me of their abnormal sensation of taste.

Increased sensitivity to loud sounds because of the loss of the restraining effect on the ossicular chain by the stapedial muscle is another distressing complaint, and causes many patients to be very unhappy in a noisy environment. When the footplate is not completely removed, regeneration may occur, or fibrous tissue may fill the gap, which will cause the hearing improvement to recede.

In my zeal to do what is right for the patient, I have travelled far and wide to observe the technique of others who report a minimum of postoperative complications. I cannot believe, however, that these complications are always due to error in technique. I believe that, more often than not, these complications are due to the patient's individual constitution, resulting in abnormal responses to minimal trauma. Not everyone reacts in the same way to trauma, and there is certainly considerable trauma when stapedectomy is performed; the structures within the labyrinth are highly sensitive and delicate.

To conclude the discussion of stapedectomy, and speaking for myself, in general, I would say that with this operation I have obtained greater satisfaction as to the end result than I ever enjoyed with the fenestration operation for the improvement of hearing in otosclerosis.

The management of the chronically diseased ear was one of Dr. Coates's pet subjects. The scope of his scholarship in the entire area of otolaryngology may be appreciated by perusal of the comprehensive five-volume survey of every aspect of the specialty which he and Dr. Schenck edited.

The principles for radical mastoidectomy as laid down by Dr. John Richards, of New York, in the early 1900s still hold to this day. Before the surgeon busies himself with the incisions, he must have, firmly fixed in his mind, a concept, and a clear one, of what constitutes a good radical cavity. He must not merely break through the bridge, clearing out what he can without danger, and then leave the operating room satisfied that he has done his best; this man, if he does end up with a good result, has achieved it more by luck than by intent.

I shall paraphrase some of the ground rules

laid down by Dr. Richards fifty years ago, which are not at all antiquated. His principles for the avoidance of errors in the performance of the radical mastoidectomy are as follows:

(a) The approach to the tympanum through the external bony canal must be adequate.

(b) That portion of the tympanic bone that forms the anterior, inferior, and posterior portion of the canal must be reamed so that it has a cylindrical form without angulation.

(c) The canal and tympanum should be almost of one diameter in all axes.

If this procedure is followed there is no chance for infection to develop in the hypotympanum and peritubal area. The portion of the posterior canal wall and annulus that overlies the deep recess of the tympanum, posterior to the round window and stapes, must be removed. With these impeding margins of the annulus out of the way, the entire medial wall of the tympanum is exposed. Only negligence and timidity can account for failure to complete the tympanic surgery. The facial ridge must be lowered to the extreme limit, whatever the size of the mastoid cavity is, so that when the mastoid cavity is viewed after operation through a large speculum, one can look directly into the area posterior to the facial ridge. The perilabyrinthine cells, if present, must be eradicated. This step is particularly important when there might be danger of overlooking cholesteatomatous prolongations that have penetrated into these spaces. The tegmen should be level and smooth. If peritubal infection is evident, the tensor tympani muscle should be removed. If the mucosa of the middle ear and the Eustachian tube are not diseased, the muscle need not be removed. The position of the facial nerve should always be known.

After the operation is completed and the bone work is finished, the next question is what to do with the cavity. A small cavity has the advantage of requiring minimal epithelization, but a small cavity will not always be our happy lot. When we are faced with an extensively diseased mastoid or one with pre-existing pneumatization when disease or cholesteatoma has penetrated into all the cell spaces, we are going to have the problem of the aftercare of a large cavity.

Since radical mastoid surgery began, surgeons have struggles with obliteration of the cavity with muscle graft, periosteal grafts, and diced cartilage. I am in favor of the muscle graft or periosteal graft, but only in cases where there is no cellular development. I consider it a very hazardous and dangerous procedure to place a graft in a pneumatized mastoid with extensive cholesteatoma.

Another controversial question which remains with us over the years is whether to graft at operation or to graft later, or perhaps to let the granulating surface epithelize naturally. In an institution such as the Massachusetts Eye and Ear Infirmary, opinions in this regard have always been varied. Some men prefer to skin graft the cavity immediately, others, only after five to seven days, and others, not at all. I have elected to use primary skin grafts, however, because they have served me well these forty years. When there was no control of infection, some of these grafts were lost, but, in the past twenty years, I can definitely say that I rarely lose an entire graft. I like a thin graft (0.0012 of an inch) cut with a dermatome from the upper lateral surface of the thigh. I then make small sectional grafts varying in length and width, depending on the area to be covered. These sectional grafts are placed on a thin flexible spatula, the same width as the graft, which is then introduced into the cavity and slid onto the bony surface. A needle holds the lower edge of the graft against the surface. The spatula is gently withdrawn. The graft now lies on the bone like paper on a wall. The grafts are then teased into the desired position. The entire operative field is covered in such a manner that no part of bone is left uncovered. To retain the grafts in position, one can use small pellets of semidry Gelfoam previously moistened in thrombin. Gelfoam is used because it does not cause the grafts to slide, wrinkle, or change their position. To exert a continuous pressure on the graft, small balls of

paraffin mesh or sponge can be used to fill the cavity. After five or six days, this packing is painlessly removed by suction. Should an odor be detected, signaling infection, the packing should be removed immediately. A culture is taken, and the cavity is dusted with antibiotic powder two or three times a day. In most cases, this will control the infection without loss of the graft.

As I have just mentioned, the basic principles and the fundamental rules of actual surgical procedures were clarified for us several generations ago. I offer no innovation in either concept or performance of a procedure which still has a very definite place in the treatment of the chronically suppurative ear.

The complete radical mastoidectomy, in which all tissue is removed, is reserved for the particular case in which any attempt to be conservative will definitely result in failure.

There are, however, other types of chronic otitis media which safely lend themselves to more conservative surgery, wherein the hearing may be retained or even improved—procedures such as those of Wullstein and Zöllner. I, however, practiced the modified radical operation for many years with the greatest of satisfaction long before the improved techniques of these two gentlemen.

According to the extent of the disease, I have advocated the following methods of surgical treatment in certain specific instances.

One of these specific instances is that of the chronically diseased ear in which the disease appears to be confined to the tympanum, with either an anterior or central perforation. We are all familiar with the widely held view that this situation rarely calls for surgical interference—a view which is a dangerous generalization. Disease causing such perforation often extends into the uppermost regions of the middle ear, antrum, and mastoid, giving rise to a progressive osteitis that will eventually require an extensive surgical procedure.

If, at operation, the mucosa of the middle ear is simply edematous, I leave it absolutely alone and treat it most gently. I make every effort not to disturb the region of the oval and round windows, thereby conserving the existing hearing. The diseased area in the epitympanum, antrum, and mastoid is thoroughly exenterated.

Another type of chronically diseased ear is that in which there is considerable destruction of the drum membrane, malleus, and incus. The mucosa of the middle ear is thickened. The disease has destroyed the membrana tympani and part of the malleus and incus in the initial stage of active infection but still persists in the epitympanum, antrum, and, possibly, the mastoid. If the hearing is poor, I make no effort to conserve any of the mucosa in the middle ear, but carry out a complete radical mastoidectomy. If the hearing is reasonably good, I make every effort to handle the middle-ear mucosa as delicately as possible, again with the idea of not causing scar formation in the region of the windows.

Another type of chronically diseased ear calling for complete radical mastoidectomy is that in which the suppuration has failed to respond to adequate medical management or minor surgical procedures directed to the middle ear, such as removal of granulations or a polyp. The middle ear will show marked changes in the mucous membrane and be highly vascularized, with recurring granulations of polyps. The hearing is usually poor. Cholesteatoma is absent, but there is definite evidence of osteitis, as indicated by the excessive bleeding from the bone. I doubt if anyone will quarrel with the decision to carry out a complete radical operation.

Still another type of chronically diseased ear, which is frequently overlooked, particularly in young children, is that with an intact membrana tympani with an epitympanic perforation. This is the type that, if neglected, usually goes on to extensive destruction due to cholesteatoma. This is the ideal type of case in which one can conserve the existing hearing, as well as eradicate the disease, if the patient is seen and operated on early. In this type of case, the modified radical is an ideal procedure. If the head of the malleus and the incus are intact, the cholesteatoma can be removed with

the use of the Zeiss microscope. One can leave the ossicles exposed in the epitympanum as in a bas relief. If the cholesteatoma can be completely removed, the epithelium from the anterior and posterior folds of the membrana tensor should be denuded, and a graft should be placed over the ossicles and the tegmen tympani, with the graft extending into the antrum and mastoid. I have performed this procedure many times successfully.

If one finds that the cholesteatoma has eroded the malleus and the incus to a point where their survival is doubtful, the head of the malleus and the incus are removed. The membrana tensor is left intact, the epithelium is denuded from the anterior and posterior folds, and a graft is laid in the epitympanum and extends over the margins of the membrane, thereby sealing the middle-ear space. The hearing can usually be maintained and sometimes be improved.

In the case where cholesteatoma has invaded pre-existing pneumatic spaces, reaching into recesses beyond the confines of the antrum and perilabyrinthine region and extending even into the tip and marginal areas of the mastoid, a huge cavity is created, posing an aftercare problem. These are the cases for which cavity-obliterating procedures have been designed and are presently being revived by otologists.

I am not attempting to cover all the various types of cases calling specifically for either a complete or conservative radical operation. I have tried to make clear that there are situations wherein no attempt is made to conserve hearing, and, on the other hand, there are other types of chronic otitis wherein every effort is made to conserve hearing and eradicate the disease.

I have purposely avoided the discussion of tympanoplastic procedures. I am fully aware of the great contributions made by the professors Wullstein and Zöllner and am heartily in agreement with their concepts. In fact, I spent a week with each of them a few years ago so that I could see at first hand and better understand what they advocated as treatment for the chronically discharging ear. After observing the meticulous care which they took to remove diseased tissue and cholesteatomatous lining and noting the time it took for them to do this, I am convinced that this is not the kind of surgery that can be readily taught to a resident. This exquisitely delicate surgery is for the man who is in a position to obtain good teaching and a continuing surgical experience in the treatment of the chronically diseased ear by these techniques. This is definitely not an operation for the surgeon with limited opportunity and who would attempt to perform tympanoplastic procedures only occasionally; such surgeons lacking the necessary experience cannot possibly enhance this work.

I realize that I have attempted to cover altogether too much ground in this presentation. When Dr. Coates spoke on otosclerosis before this Society, there was not much to be said about the subject, whereas today it is one of the main topics for discussion in otology.

The chronically diseased ear used to be treated conservatively, such as by removal of granulations or polyps or by the use of dusting powders and ear drops. In the event that these measures failed to improve the condition, it was treated by a radical mastoidectomy or, less frequently, by a modification of the radical without regard for the hearing. Since the antibiotics, the emphasis has been on the improvement of the hearing, as well as on the eradication of the disease.

I have tried to emphasize that the treatment of otosclerosis by one or the other of the several techniques of stapedectomy offers an opportunity to improve hearing to a degree heretofore unknown. I have also discussed my personal management of the various types of chronic otitis media, with due acknowledgment of the contributions of the professors Wullstein and Zöllner. Without a doubt, the acceptance of the advances made in the last decade in otology augurs well for our specialty.

Acupuncture and Other Forms of Counterirritation[1]

By FRANK A. ELLIOTT, M.D., F.R.C.P.[2]

MANKIND'S belief in the symptomatic efficacy of counterirritation in one form or another dates from the earliest times. Perhaps the most ancient method of them all is acupuncture, evolved by the Chinese before the time of Confucius and still widely used in the Orient. It seems to have spread to the West too, for in a paper published in Paris in 1952 (1) the method is both explained and extolled. The skin is punctured at points designated by tradition, using specially devised needles of various metals; needless to say, those made of gold were reported to be the most efficacious. Ancient Chinese and Japanese charts, drawn up for the guidance of practitioners indicate that generally speaking the punctures were made at the site of disease—in the skin of the temple in disease of the eye, in the scalp or back of neck for headache, or the abdomen for abdominal complaints, and so on.

Moxabustion—the application to the skin of a smoldering pellet of ragwort—is approximately coeval with acupuncture, and it, too, is still practiced in oriental communities all over the world. Generally speaking, the moxa was applied to whatever part of the body it was intended to influence and the charts for acupuncture and moxabustion look alike. A very much more vigorous use of heat is the cautery. It was approved by Hippocrates, Celsus, and Galen, and in the 10th Century A.D. the Arabic physician, Avicenna spoke well of it. He advised the cautery "for a member whose cold temperature we wish to rectify" but cautions that when it is applied to the head (in epilepsy for instance) care should be exercised "not to boil the brain or shrivel its membranes" (2). It is interesting to note that the treatment of strained tendons in horses by "firing" persists in many parts of the world.

Another form of counterirritation, cupping, has a long and honorable history. A cup of metal or glass was heated and placed, rim down, on the skin. With cooling a partial vacuum formed inside it, and the integument was slightly drawn into the cup; the skin became cyanosed and might actually bleed. In wet cupping the congested area of skin was then incised, for good measure. Brockbank relates that in 1750, Heister constructed a mechanical scarifier, consisting of a small box containing 16 spring-loaded knives which were released by a lever. Cupping was also practiced by Africans, who used a buffalo horn; the witch doctor achieved a partial vacuum by exerting powerful oral suction at a hole in the tip of the horn. Brockbank states that the same method was used by American Indians. Marshall Hall, (3) a respected physician at St. Thomas' Hospital in London, spoke highly of cupping but thought that it might act on the imagination, though "the effect is as real as if the agency were of the most physical kind" (Hall 1845.)

Setons and issues were foreign bodies deliberately introduced into the subcutaneous tissue to promote a local inflammatory reaction. The practice goes back at least as far as the 7th Century and was still in use in the middle of the 19th Century. Hall recommended their use, in the lumbar area, for disease of the kidney and also remarked that they helped cases of spinal paraplegia provided the seton was applied at the level of the disease.

Blistering, by means of cantharides, mus-

[1] Read before the Section on Medical History, College of Physicians of Philadelphia, 21 November 1961.

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tard, and other vegetable rubefacients was widely used as a convenient method of inducing mild counterirritation and it is still used, usually in the form of a mustard plaster in Europe, Russia, and Asia. It is recorded that George III had blisters applied to his scalp, underneath his wig, in an attempt to cure the mental distemper which had such momentous historical consequences.

Leeches have been used since the 2nd Century B.C., and the fact that a doctor was often spoken of as a leech in the 17th and 18th centuries implies that at that time leech and doctor were more or less inseparable. Leeches were used to relieve the body of excess blood and evil humors, and were generally applied to the painful or inflamed area. The writer was astounded to see them in use in a London hospital in 1937 for the treatment of hepatic pain in congestive heart failure. Some patients would not be denied their leeches and stated emphatically that neither venesection nor the use of mercurial diuretics produced anything like the relief that was afforded by a couple of vigorous leeches. Unlike almost all other forms of counterirritation a leech does not cause pain, itching, or burning and the patient is usually totally unaware of its presence. When removed it leaves a small hole from which the blood oozes, surrounded by an area of cutaneous erythema.

With the passage of time the robust methods of the past have given place to more sophisticated techniques including the use of elegant rubefacient creams containing capsicum, methyl nicotinate, nonylic acid vanillylamide, and other substances. Ultraviolet light, diathermy, ultrasound, and stimulation of the skin by a variety of mechanical contraptions are also being used throughout the world. In the past 35 years there has been a revival of interest in the theoretical aspects of counterirritation and there have been numerous experimental studies in man and in animals, some of which are reviewed in a monograph by Kibler (4). It has been demonstrated beyond reasonable doubt that stimulation of the skin can influence the blood supply in viscera which are segmentally related to the area of the skin so treated, and it has also been shown that the tone and motility of the gastrointestinal tract can be influenced in this way. Freude and Ruhmann (5) reported that in man the application of either warmth or cold to the epigastrium induced changes of tone in the stomach, and Boas (6) found that a peptic ulcer could be made to bleed by the application of warmth to the epigastrium. Definitive studies carried out in this country by Haselwood and Kuntz (7) and by Kuntz (8) show that if vasodilatation is induced in the skin of the mid-dorsal area in spinal cats and rats the stomach and intestine show a corresponding vasodilatation, whereas the application to the same area of stimuli which would ordinarily be painful in the intact animal, or the use of extremes of heat or cold, would induce vasoconstriction in both the skin and the viscera. The visceral responses were not obtained if the dorsal roots of the relevant area were cut. These studies, taken in conjunction with many others carried out on man established the reality of the cutaneo-visceral reflex upon which the effects of some forms of counterirritation seem to depend. But, while it seems reasonable and acceptable that sensory stimuli of the skin might evoke visceral reflexes it is more difficult to explain why rubefacient ointments which cause virtually no overt sensory stimulation should have any visceral effects.

It is necessary to divide counterirritants into two classes—those which produce cutaneous sensory stimulation and those which do not. However, these two classes do have something in common in that whether the counterirritant produces overt sensory stimulation or not, all varieties lead to a local erythema of the skin. That such erythema might play a significant role in cutaneo-visceral "reflexes" is supported by experiments undertaken by the writer in another context, which are to be published in full elsewhere and can only be summarized here.

It was found that if erythema was induced in front of the thigh or in the popliteal space by the application of methyl nicotinate ointment

or a mustard plaster, the appearance of the erythema on the thigh or popliteal space was followed after about 30 or 40 minutes by a slight rise of temperature in the toes in some normal subjects. However, in the presence of peripheral vascular disease the induction of erythema on the thigh produced a highly significant rise of temperature in the ipsilateral foot, and a smaller rise on the contralateral side. The rise of temperature in the toes as determined by a thermistor electric thermometer varied from 3°C. to 10.5°C. It did not occur unless a violent erythema of the skin was produced by the rubefacient and the response was either attenuated or abolished if the ambient temperature was sufficiently low to induce body cooling. The peripheral response started about 40 minutes after the first appearance of erythema on the thigh, but it outlasted the latter by many hours. The response was inhibited or abolished by the prior administration of 1 mg. of atropine. There was no rise of temperature in the foot if the patch of erythema was induced on the abdominal wall instead of on the thigh—that is to say, the response appeared to depend on a zonal or segmental mechanism. Josenhans (9) found increases of finger temperature in rheumatic subjects following the application of a rubefacient cream (Finalgon) to the skin over the back in the area C-8 to D-1; the rise of temperature in the fingers was accompanied by dilatation of the capillaries in the nailbeds.

In a further series of experiments erythema was induced by methyl nicotinate ointment on the anterior triangle of the neck in five normal subjects, and the spinal fluid pressure was monitored over a period of one hour. There was no change of pressure, and the transmitted cardiac pulse did not increase in amplitude during the period of observation. However, when the experiment was repeated in ten patients with recent cerebral infarction, the spinal fluid pressure rose by from 30 to 80 mm. of water some thirty minutes after the onset of the cutaneous erythema, and the rise persisted after the erythema had disappeared. Moreover, during this time the cardiac pulse as seen in the spinal fluid increased in amplitude as registered both visually and by an electromanometer attached to the lumbar puncture needle. This increase in amplitude is an indication of intracranial vasodilatation. In two of these patients, there was a transient, but distinct improvement of symptoms at the time of the experiment. In a third patient, who had a right visual defect and a left hemiplegia due to a carotid embolus, sight returned to normal twenty minutes after erythema was induced on the neck and it remained normal thereafter. This patient has been followed for six years and there has been no deterioration of sight in that eye. It seems therefore, that both in the leg and in the head cutaneous vasodilatation can induce "reflex" dilatation of vessels at a distance. The underlying mechanism is not clear, but the delay of at least thirty minutes between the appearance of the cutaneous erythema and the onset of peripheral or deep vasodilatation implies that some chemical factor may have to accumulate in the skin and that it may take thirty or more minutes before it reaches a titre sufficiently high to stimulate afferent nerve fibers. This hypothesis arises from the fact that bradykinin, which is produced, inter alia, by sweat glands, appears in the cutaneous tissue when the skin is heated (10), and bradykinin, like some other polypeptides, is capable of stimulating afferent nerve endings. Crismon and his colleagues (11) found that the blood flow in the human forearm was almost doubled by inducing erythema of the skin below the elbow, using a nicotinic acid ester, and the response was uninfluenced by blocking the cutaneous nerves to the forearm. On the other hand, the experiments of Haselwood and Kuntz showed clearly that section of the dorsal roots serving the area to which cutaneous stimuli were applied, prevented vascular responses in the stomach and small intestine. It, therefore, seems likely that visceral vasodilatation is mediated by a neural mechanism and the reduction of the response by atropine suggests that a cholinergic system is involved.

Whatever the true explanation may be, it

seems clear that erythema produced in the skin by a wide variety of thermal and chemical agents has been shown to produce deep vasodilatation on a segmental or zonal basis. At the same time, other experiments have shown that both in men and in animals sensory stimuli delivered to the skin can produce alterations of visceral tone and blood supply, also on a segmental basis. It therefore appears that there is a physiological explanation for man's long cherished belief in the efficacy of counter-irritation, a circumstance which we would do well to remember when tempted to deny the existence of phenomenon which we do not understand. As Jean Jacques Rousseau (12) wrote in his *Confessions*: "in complete contrast to theologians, doctors and philosophers only admit to be true such things as they are able to explain; they make their own understanding the measure of all possibilities".

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The Early History of the Cerebral Ventricles*

By EDWIN CLARKE. M.D., M.R.C.P.†

THE historian of medicine often condemns the general historian for neglecting the medical aspects of historical events and individuals, and in some instances he is justified in doing so. But it naturally follows that he himself must not overlook general historical, political, economic, social, religious, and other factors in his own work.

The early history of the brain ventricles shows how the less common religious factors may assume importance when an attempt is being made to interpret what appears to be a purely anatomical and physiological problem. During most of Graeco-Roman antiquity, crude knowledge of the ventricles existed, but in the Medieval Period this was replaced by an elaborate scheme of form and function which was mostly the product of speculation. My plan is to trace this story from the third century B.C. to the 16th century, A.D., and to examine first the contributions of classical antiquity, and then to consider the curious medieval ventricular theory, and finally its decline in the 16th century.

The brain and meninges are mentioned for the first time by the Egyptians[1] but, like the Presocratic philosophers who occasionally investigated the brain, as far as we know they knew no anatomical details. Even the Hippocratic writers, who often refer to the brain in health and in disease, make no mention of its internal structure. The majority of them, like many of their predecessors, thought of it as the seat of the soul, the immortal part of which Plato also located there.[2]

As far as we can tell from the available sources, the ventricles of the brain were first mentioned by Aristotle in the 4th century B.C. In his book *The History of Animals* he describes the brain and says: "in the great majority of animals, it has a small hollow in its centre."[3] We can be almost certain that Aristotle did not dissect the adult human,[4] but had he been asked about man, he would have applied his knowledge of animal anatomy without hesitation or misgiving.[5] In opposition to his predecessors, including his teacher Plato, he placed the principles of life and the appreciation of all sensation in the heart, and delegated the brain to a less important task.[6]

But the first substantial contribution to our knowledge of the ventricles was probably made by Herophilus, working in Alexandria at the beginning of the 3rd century B.C. It is said that he not only described the ventricles and their intercommunications, but that he also mentioned the choroid plexus and considered that the fourth ventricle was the most important part of the system. Contrary to Aristotle, he placed the dominant principle of the soul in the brain, and he believed that it

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[1] Breasted, James Henry: *The Edwin Smith Surgical Papyrus*. Vol. 1, Chicago: University of Chicago Press, 1930, Case 6, pp. 164–174.

[2] Cornford, Francis Macdonald: *Plato's Cosmology. The Timaeus of Plato translated with a Running Commentary*. London: Kegan Paul, Trench, Trubner & Co. Ltd., 1937, pp. 150–151.

[3] *The Works of Aristotle*. Ed. J. A. Smith and W. D. Ross. Volume IV, *Historia Animalia*, translated by D'Arcy Wentworth Thompson. Oxford: Clarendon Press, 1910, Book I 16, 495a6.

[4] Lones, Thomas East: *Aristotle's Researches in Natural Science*. London: West, Newman & Co., 1912, pp. 103–105.

[5] Aristotle: *op. cit.*, (Note 3) I 16; 494b.

[6] Aristotle: *op. cit.* (Note 3). Vol. V, *De partibus animalium*, translated by William Ogle. Oxford: Clarendon Press, 1911, Book III 3; 665a.

resided in the cavities of the ventricles.[7] Thus the Presocratic and Platonic idea of localization of the soul within the brain now had an anatomical basis.

Erasistratus, probably a younger contemporary of Herophilus, had a theory of ventricular function which prevailed, with various modifications, up to the 18th century. He considered that in the heart inhaled air became vital spirits which were then distributed throughout the body. In the cerebral ventricles they were converted into animal spirits which acted as a motive force and which were conveyed by hollow nerves to all parts.[8]

After a period of 400 years, Galen took up this theory. His system was more complicated, but we need consider only the events in the brain.[9] The animal spirits were produced there and they were stored in the ventricles where their movement from one ventricle to another was controlled by either the choroid plexus (between lateral and third ventricles) or by the vermis (between third and fourth ventricles). The soul, according to Galen, was in the substance of the brain and not in the ventricles as Herophilus had believed. He had the following very good reason. He argued that traumatic lesions of the brain which penetrate to the ventricles may deprive the individual of sensory and motor activities, but they are not necessarily immediately fatal as would be expected if the soul resided in the ventricular system.[10]

This then was the state of knowledge at the death of Galen, about 200 A.D. The ventricular system and the choroid plexus had been identified, the early Greek idea that the brain was the body's central organ and that the soul resided in it had been taken up by Herophilus and then by Galen who had each elaborated a theory of function; according to Herophilus the soul was in the ventricles, but according to Galen the animal spirits which were the agent of the soul were there, whereas the soul itself was to be found in the brain tissue. Aristotle's assumption that the heart was the prime organ survived throughout the Medieval Period but will not concern us here.

Further practical studies of the brain had to wait for the Renaissance, but two associated developments took place during the Medieval Period: firstly, the localization of psychological functions within the ventricles was advocated, and secondly a method of representing this system pictorially was evolved. The rest of my story deals with these two interesting sequelae. Being largely conjectural, they characterize well the medieval approach to a medical problem.

Their exact origin are difficult to determine but we do know that a Byzantine physician Poseidonius had begun to relate mental function to special areas of the brain, probably towards the end of the 4th century A.D.[11] His deductions may have been based originally on the clinical observation of patients with head injuries. Thus he considered that lesions of the front of the brain interfered with the appreciation of sensation of all kinds, whereas those of the posterior part resulted in a memory defect. Furthermore damage to the middle *ventricle* (i.e. our third) produced a disturbance of reason. Here for the first time a single mental function was localized to a single cerebral ventricle.

It is of importance to realize that Poseidonius, and those mentioned so far, were pagans and that Christian writers took up the idea for reasons which will be discussed shortly. Thus Nemesius, Bishop of Emesa, a younger contemporary of Poseidonius, placed all psychological activities in the ventricles, each ventri-

[7] Marx, K. F. H.: *Herophilus. Ein Beitrag zur Geschichte der Medicin.* Carlsruhe und Baden: D. R. Marr, 1838, pp. 24–27. (From Galen, Kühn XIX, 345.)

[8] Dobson, J. F.: "Erasistratus." *Proc. Roy. Soc. Med., Lond.*, 1927, **20** (Parts i and ii), 826–832.

[9] Singer, Charles: *Vesalius on the Human Brain.* London: Oxford University Press, 1952. pp. xviii–xx.

[10] Kühn, C. G.: *Medicorum graecorum opera quae exstant.* Vol. V (Galen). Lipsiae, 1823, p. 609.

[11] Lewy, A. [revised by Landsberg]: "Ueber die Bedeutung des Antyllus, Philagrius und Posidonius in der Geschichte der Heilkunde." *Janus (Henschel) Leipzig*, 1847, **3:** 166–184. (see pp. 170–171.)

cle being responsible for a specific activity.[12] His scheme was as follows: the anterior ventricle (our lateral) was responsible for the mixing of sensation and for imagination; the middle ventricle (our third) for cogitation and reason; and the posterior ventricle (our fourth) for memory. This follows Galen who established the main faculties of the sensitive soul[13] and it also follows Poseidonius whose localization was essentially the same. The shift from brain substance to brain ventricles was now complete.

The system is designated the Three Cell Theory or Doctrine although there were in fact four, the two lateral ventricles usually being considered as one. It is interesting here to note an analogy. It has been suggested[14] that the evolvement of the theory may have been influenced by a comparison of the brain with the architecture of a Greek temple, where specific legal procedures were carried out in each of three rooms. Be this as it may, the strongest influence seems to have been religious.[15] The Christian writer of late classical antiquity considered the soul to be a substance without a body. It could not be localized in the body and was joined to it as light is joined to the air. Nevertheless functions of the mind—the three already mentioned, imagination, reasoning, and memory—could be localized, and in keeping with Plato's teaching, the place to look for them was in the brain. In the brain, there were two possible sites, the substance of the brain, according to Galen, or the ventricles, according to Herophilus. Now the theologians thought the spaces of the ventricles a more suitable intermediary between the body and the non-corporeal soul than the substance of the brain. In addition, the relationship with the Trinity may have been a factor in their considerations. Thus the Three Cell Theory of ventricular localization seems to have been a Christian version of a Presocratic and Platonic tradition.

The Theory can now be examined more closely. It was at this time established that all thought depended upon the perception of sensations and when all types of sensation from the various sense organs were brought together the *sensus communis* resulted; *sensus communis* meant the mixing of sensations, or "the common sense" and not "commonsense" as we think of the term today. When a person begins to think, there is a mixing of sensations with the production of imagination. Being the first to take place it should be in the front of the brain, i.e. in the lateral ventricles. The images produced thereby must then be digested and this is reasoning or cognitation which occurs in the middle cell or ventricle (our third ventricle). Some thoughts are kept back for storage and this is memory, located in the posterior or fourth ventricle. Thus brain function was seen as a three-stage sequence of imagination, digestion, and retention. The next step in the argument was to find appropriate anatomical explanations for these processes, and this was not difficult.

The anterior cell (lateral ventricle) is soft and moist, and thus it facilitates the mixing of sensations and the production of imagination. The next process, thinking or reasoning, like the digestion of food, needs heat and so the most appropriate place will be the warmest place, that is, the middle or third ventricle. The posterior or fourth ventricle is cool and dry and therefore ideal for storage. Accounts of this scheme can be found in many writings; St. Augustine (354–430 A.D.), for example,

[12] Domanski, B.: "Die Psychologie des Nemesius." *Beitr. zur Gesch. der Philos. des Mittelalt.* (Münster), Band III, Heft 1, pp. 90 ff.

[13] Kühn, C. G.: *op. cit.*, Vol. VII, p. 56.

[14] Several authors have put forward this suggestion. See Woollam, David H. M.: "The historical significance of the cerebrospinal fluid." *Med. Hist.* 1957, I: 91–114 (see p. 95) for this and for a consideration of the whole Doctrine.

[15] Pagel, Walter: "Medieval and Renaissance contributions to knowledge of the brain and its functions," from *The History and Philosophy of Knowledge of the Brain and its Functions.* (An Anglo-American Symposium, London, July 15–17, 1957). Oxford: Blackwell, Scientific Publications, 1958, pp. 95–114. This author also discusses the Doctrine in detail.

mentions a modified form of it.[16] Interestingly enough, this basically Christian Doctrine was accepted by all Arabic authorities and it came back to Europe when their writings were translated into Latin.

In the 9th century, a dynamic element was added.[17] Galen's idea of valves, the choroid plexus and the vermis, which regulated the flow of animal spirits in the ventricular system was applied to the ventricular theory. Thus, thought processes could be regulated and the mental responsiveness of an individual was determined by the speed of events in the ventricles. Furthermore the position of the head could control the valves; thus throwing the head back when trying to remember moved the vermis and allowed the free passage of spirits from one ventricle to another; on the other hand when the head was bent forward the vermis closed the passage and concentration was now possible.

Only the basic form of the ventricular theory has been described but as it dominated all medieval considerations of the brain, there were many forms of it.[18] At least 25 varieties are to be found and there are many illustrations in medieval manuscripts and early printed books. This is the second part of the story, the pictorial representation of the Doctrine.

Sudhoff has depicted many examples[18] and some of them have appeared frequently in other publications. The simplified schemes of Albertus Magnus[19] show the lateral view of a head with three labelled circles in it arranged one behind the other and representing the three cells. That of Peyligk[20] includes two anterior cells side by side as well as the middle and posterior; these presumably represent the lateral ventricles. The diagram in Reisch's *Margarita Philosophica*[21] is also a simple one, but the anterior cell is connected by lines to each of the special sense organs, indicating the pathways of the various sensations which make up the *sensus communus*. A similar but more complex arrangement is seen in the manuscript drawing in a copy of Harderwyck's *Epitomata*.[22] However, the head is merely divided into three portions and the cells are not drawn. This is also the case with the two contemporary drawings of the late 15th century recorded by Sigerist[23] and they are reminiscent of the phrenologists' illustrations of the early 19th century. As Sigerist points out they provide a striking example of the change taking place in art at this time as medieval techniques were replaced by those of the Renaissance. Another interesting example is one of the manuscript drawings of Sudhoff;[24] it depicts a compartmentalized head shaped like bishop's mitre, perhaps another indication of the religious background of the Ventricular Doctrine.

The revival of anatomy in Europe in the late 15th century at first made certain adjustments to the Doctrine necessary and early in the 16th century there was a sudden change in the pictures depicting the ventricles. Practical anatomists soon found that the internal structure of the human brain was very different from what was depicted in their standard books and manuscripts. One of the best examples is the differences between Leonardo da

[16] Augustinus, Aurelius: *Hipponensis episcopi opera omnia* Tom VI. Migne Patr. lat. 40, Parisiis 1844, Spalte 782 ff. Cited by Sudhoff, *op. cit.* (Note 18), p. 12.

[17] As Pagel has pointed out (*op. cit.*, p. 101), the Christian Costa ben Luca of Baalbek was responsible for this. See, Thorndike, Lynn: *A History of Magic and Experimental Science.* Vol. 1, New York: The Macmillan Company, 1923, p. 659.

[18] Sudhoff, Walter: *Die Lehre von den Hirnventrikeln in textlicher und graphischer Tradition des Altertums und Mittelalters.* Inaugural-Dissertation, Leipzig, 1913.

[19] *Philosophia Pauperum.* Brixiae, 1490, and *Ibid.*, Venetiis, 1496.

[20] Peyligk, Johannes: *Compendium philosophiae naturalis.* Lipsiae, 1499, Caput physicum.

[21] Reisch, Gregor: *Margarita philosophica, totius philosophiae rationalis et moralis principia,* etc. Friburgi, 1503.

[22] Poynter, F. N. L.: *A Catalogue of Incunabula in the Wellcome Historical Medical Library.* London: Oxford University Press, 1954. Fig. 8 shows a pen drawing discovered on blank leaf KK6, preceding the tract "De sensu," in the *Epitomata*, Cologne, 1496 of Gerardus de Harderwyck.

[23] Sigerist, Henry E.: "Two Fifteenth Century anatomical drawings." *Bull. Hist. Med.*, 1943, **13:** 313–319.

[24] Sudhoff: *op. cit.*, Tafel II.

Vinci's traditional diagram, drawn probably in 1490,[25] and his sketches of the ventricular system some 14 years later.[26] In the interval he had examined wax casts of the ventricles. Similarly the title-page of Berengario da Carpi's *Tractatus de fractura calve sive cranei* published in 1518 shows the profile view of a head with three circular areas, yet the second edition of his *Isagogae breves . . . in anatomiam* of 1523 contains illustrations of the ventricles which, although crude, indicate first-hand knowledge of brain anatomy.

Meantime the Three Cell Doctrine was being criticized and it was Vesalius in his *De fabrica* of 1543 who brought about its downfall. He recalls how as a student he had to learn the three-cell system and be able to draw it, but after giving a detailed and relatively accurate description of the human ventricular system, he writes:

> "All our contempories, so far as I can understand them, deny to apes, dogs, horses, sheep, cattle, and other animals, the main power of the Reigning Soul—not to speak of other [powers]—and attribute to man alone the faculty of reasoning; and ascribe this faculty in equal degree to all men. And yet, we clearly see in dissecting that men do not excel those animals by [possessing] any special cavity in the brain. Not only is the number [of ventricles] the same, but also all the other things [in the brain] are similar, except only in size and in the complete consonance [of the parts] for virtue."[27]

With this simple observation the whole complex theory was undermined. Nevertheless it did not disappear from medical writing immediately. Thus Harvey[28] makes reference to it in 1616, and, according to Steno,[29] some still adhered to it in the middle of the 17th century. Amongst lay writers traces also remained; Henry More,[30] the Cambridge Platonist, alludes to it and Shakespeare[31] in *Loves' Labors Lost* of 1588 speaks of "the ventricles of memory."

But on the whole these were only vestigial remnants and the medieval theory was transmitted into the 17th century by only a few tenacious traditionalists. The illustrations of the cerebral ventricles in all the anatomical textbooks, although still crude, now resembled those of today and the ventricular system, instead of housing the most exalted portion of man, his psychological functions, had more humble tasks to perform. Venner[32] mentions one of them:

> "Beere that is too bitter . . . causeth the headach, by filling the ventricles of the brain with troublesome vapours."[31]

But the basic concept of localization of function within the brain did not die. In the year after Venner wrote, 1621, Thomas Willis was born and it was he who, together with his contemporary, Descartes, took the concept a step further. And we can detect obvious similarities between the Three Cell Doctrine and phrenology. Thus from obscure and probably religious beginnings in classical antiquity and the Middle Ages, we can trace the idea down to our own time, which is itself but a point on a long road reaching into the future.

[25] O'Malley, Charles D. and Saunders, J. B. de C. M.: *Leonardo da Vinci on the Human Body.* New York: Henry Schumann, 1952, pp. 330–331.

[26] *Ibid.*, pp. 336–341.

[27] Singer, *op. cit.*, p. 40.

[28] Harvey, William: *Lectures on the Whole anatomy.* An Annotated Translation of *Prelectiones Anatomiae universalis* by C. D. O'Malley, F. N. L. Poynter, and K. F. Russell. Berkeley and Los Angeles: University of California Press, 1961, p. 220.

[29] Steno, Nicolaus: *Discours de Monsieur Stenon sur l'anatomie du cerveau.* Paris, 1669, pp. 10–11. Steno describes the Theory and then speaks of "those who are still of the same opinion."

[30] More, Henry: *A Collection of Several Philosophical Writings of Dr. Henry More.* London, 1712. This includes his "Antidote against Atheism . . . with an Appendix thereunto annexed" which was first published in 1655 and which, on page 206, has the following passage: "Suppose memory were thus seal'd upon the Brain, and transmitted its Image through the Animal Spirits in the ventricles."

[31] *Loves Labours' Lost.* IV, ii, 70.

[32] Venner, Tobias: *Via recta ad vitam longam, also the True Use of our Famous Bathes of Bathe.* London, 1620, ii, 35.

Extinct Medical Schools of Nineteenth Century Philadelphia: (I) The Medical Department of Pennsylvania College

By HAROLD J. ABRAHAMS, PH.D.

DURING the middle decades of the nineteenth century, there arose in Philadelphia a number of medical schools[1] whose lives were destined to be but of short duration. For a time they thrived, achieved a measure of usefulness and distinction, then, as though to fulfill the words of the royal psalmist, after flourishing in the morning and growing up, in the evening they were cut down and passed into extinction. As living things often leave their fossil remains, so these schools bequeathed us their artifacts, in the form of printed yearly "announcements" which now rest on the shelves of the Library of the College of Physicians of Philadelphia, and elsewhere, available for study.

This, the first part of a study of these schools, deals with the Medical Department of Pennsylvania College.

In 1839, Dr. George McClellan, newly dismissed from the faculty of Jefferson Medical College, which he had founded, associated himself with Drs. Samuel Colhoun, William Rush and Samuel G. Morton, all Philadelphia physicians, and on September 14 of that year, wrote to the Board of Trustees of Pennsylvania College, a Lutheran institution at Gettysburg, requesting that they be organized as a medical faculty in Philadelphia and as a Board of Regents empowered to confer the degree of doctor of medicine upon those candidates who could meet the following requirements:

1. Three years of study under a respectable practitioner of medicine.
2. Two years of attendance at full courses of lectures, at least one of which should be at this college, and another either at the same or some other respectable school; "or, in lieu thereof one full course of lectures with not less than four years assiduously devoted to the practice of medicine after the regular period of study."
3. Passing of an examination, conducted by the Faculty, in the presence of a committee of three respectable practitioners of the city or state, who, with the Faculty, will certify to the Board of Trustees of Gettysburg College that the Candidate has met the requirements for the medical degree.

The Trustees at Gettysburg granted the request by resolution, and appointed the four petitioners to the Faculty of the Medical Department of Pennsylvania College in Philadelphia, as it was henceforth called, with the powers requested. The school was virtually autonomous, despite frequently acknowledged subordination to the college at Gettysburg and the payment into the treasury there of one-half of the matriculation fees of $5.00; $2.50 for the college at Gettysburg, and $2.50 for the Medical Department.

Before the first year had ended, McClellan and Rush asked for, and obtained, from the Pennsylvania Legislature, an amendment to the College Charter, authorizing it to grant medical degrees in Philadelphia (March 1840). The Legislature, in the second section of the act of amendment, made it impossible thereafter for any other college "to establish any Faculty for the purpose of conferring degrees

[1] The Medical Department of Pennsylvania College, The Philadelphia College of Medicine, The Franklin Medical College, Penn Medical University, Philadelphia University of Medicine, American University of Pennsylvania, Electic Medical College of Pennsylvania, etc.

. . . in any City . . . other than that in which said college is . . . located."

1. BUILDINGS AND EQUIPMENT

The first Medical Department building stood at Filbert Street, above 11th, in a "pleasant, respectable and healthy part of the city", and was said to be commodious, elegant, well-lighted and ventilated and admirably adapted to its use. There were two lecture rooms, (one adapted to anatomical purposes), a museum, a reading room, a dissecting room and a chemical laboratory. The building was heated by means of warm-air furnaces and lighted with gas and supplied with "Schuylkill water . . . introduced into each story". It was claimed that all conveniences conducive to cleanliness and comfort were available. It served in its capacity as the medical school building for ten years. A dispensary was open daily and clinical facilities at Blockley and Pennsylvania Hospitals were accessible to students of the college.

In 1849 a lot was purchased for the erection of a new home for the school at the southwest corner of 9th Street and Shield's Alley, below Locust. A deep-seated change in the Faculty had taken place in the ten years' operation of the college. The first major change was the death of Dean Colhoun, and his replacement by Dr. Robert M. Bird, in 1841. A second upheaval was the resignation of the entire faculty in September, 1843, due to personal differences among themselves, as well as to financial problems. (George McClellan's letter of resignation, reproduced in one of the publications of the college,[2] shows a deletion—probably an allusion to a personal controversy.) The Trustees acknowledged the dissolution of the Faculty and empowered it to appoint a new Faculty from among former members, or elsewhere.

Time was growing short before the new sessions would open and the Board of Trustees could not, according to the charter, hold a special meeting before another four weeks. The old Faculty failing, or refusing, to act, despite a plea from both Secretary of the Board and the President of the College, their written relinquishment of all rights and use of the charter, signed by four of their number, was followed by transfer of these rights to a group of local physicians on November 6, 1843, thus creating an entirely new Faculty. This came about in the following manner: the old Faculty having failed to agree upon their successors, Drs. William Darrach and Henry S. Patterson, armed with a letter from Dr. Morton, went to Gettysburg to solicit for themselves and Drs. William R. Grant and John Wiltbank, appointments as members of the new Faculty. The Board at Gettysburg advised the issuance of the relinquishing document and in April 1844, confirmed the new Faculty appointments. Dr. David Gilbert, secretary of the Board at Gettysburg, was added to the Faculty at this time, as was Dr. Washington L. Atlee.

Another significant development was an Act of March 29, 1849, in which the State Legislature created a fifteen-man body known as the "Trustees of the Medical Department of Pennsylvania College", tacitly giving the Faculty of the Medical Department still greater independence and authorizing it to erect the new building alluded to above, through the agency of its Trustees, incorporated for purposes of raising a loan of $40,000 and holding the property in trust for the Medical Department. The Faculty was also to have the power to fill vacancies which might arise on the staff. The new building, "the most complete and elegant structure of its kind in America" (2), was of "collegiate Gothic" design and was equipped with three lecture rooms, each seating five hundred persons, a museum, dissecting room, offices for professors, ante-rooms for students and living quarters for the janitor. It was shielded from street noises by the location of the building. Audio-visual facilities in the lecture rooms were good and the museum was large, attractive, and had means for illustrating lectures

[2] "Statement of Facts Connected with the Reorganization of the Faculty of the Medical Department of Pennsylvania College" (1855).

with anatomical and pathological specimens, wet and dry, and paintings, surgical apparatus, plates, drawings, wax, plaster, leather and papier maché models. An extensive cabinet of materia medica with painted plates and dried specimens of medicinal plants from all over the world, was also provided, with obstetrical models, drawings and preparations. There was a reading room which was supplied with journals (foreign and American) on medicine, surgery, science in general, and with daily newspapers of Philadelphia and various parts of the country. The dissection room was large, well ventilated, had an abundance of material and was supervised by the Professor of Anatomy, assisted by the Demonstrator. Special attention was given to medical chemistry "(particularly as it applies to physiology and pathology) in a laboratory well supplied with apparatus and the course made interesting and attractive to the student." Clinical instruction was, as before, at Blockley and Pennsylvania Hospitals. Tickets for free admission to other Philadelphia hospitals were also issued to students. There was a faculty-foundation for free scholarships to a limited number of students. The great Library of the Pennsylvania Hospital was also accessible to students. Some years later a clinic on diseases of women was established by the Professor of Midwifery.

In 1851 Atlee resigned, and in 1852 Grant died. The chair of "Institutes" was introduced and Dr. Francis G. Smith was appointed to it. Drs. John J. Reese and J. M. Allen became members of the faculty in 1852. By the resignation of Dr. Patterson in 1853, the chair of Materia Medica and Therapeutics became vacant and Dr. John B. Biddle was appointed his successor.

In 1854, great bitterness and recrimination split the faculty into two irreconcilable factions. Drs. Darrach, (President) and Wiltbank, attempting to oust Drs. Gilbert, Reese, Biddle, Smith and Allen, made a denial of the fact that despite virtual independence from Gettysburg College, the Medical Department did have a tie to the mother institution, as evidenced by the payment of half of all matriculation moneys into the treasury at Gettysburg and numerous allusions to the same fact at public functions. At a private meeting held on April 19, 1854, Darrach and Wiltbank passed a resolution expelling the other five professors in their absence, and repudiated all allegiance to the parent institution.[3] On June 6, 1854, the Trustees at Gettysburg unanimously vacated the chairs held by Darrach and Wiltbank, whereupon the two professors, jointly with the Trustees of the Medical Department Building, created by act of State Legislature in 1849, to hold the new building in trust, filed a bill in equity in the Court of Common Pleas of Philadelphia against the Medical Faculty and the Gettysburg Trustees, asking an injunction on grounds that Gettysburg had no jurisdiction over the Philadelphia school. The injunction was denied and Darrach and Wiltbank were replaced by Dr. Alfred Stillé and Dr. Gilbert, respectively.

In 1858, the eleven-year-old Philadelphia College of Medicine made an agreement with the Medical Department of Pennsylvania College, probably due to mutual financial difficulties, that after one year from date the two schools should merge. In the Spring of 1859 the entire faculty of the Medical Department of Pennsylvania College resigned and that of the Philadelphia College of Medicine presided over the merged schools, which bore the title, "Medical Department of Pennsylvania College." The Civil War reduced enrollment, causing a decline in income, and a large

[3] The five professors appealed, through Dr. Gilbert, to Darrach and Wiltbank to resign, for the good of the school, and claimed that the unpopularity of the two was causing a decline in enrollment. The five published, "A Statement of the Facts Connected with the Reorganization of the Faculty etc.", a 64-page pamphlet (octavo). This was replied to by Darrach in a 68-page (octavo), "Reply to a Pamphlet Entitled 'A Statement of the Facts', etc"., and this in turn, drew a rebuttal from the five professors, having the title "A Refutation of the Misstatements Contained in a Pamphlet etc.," 64 pages (octavo). These three pamphlets, in the Library of the College of Physicians of Philadelphia, give evidence of the bitterness of the controversy.

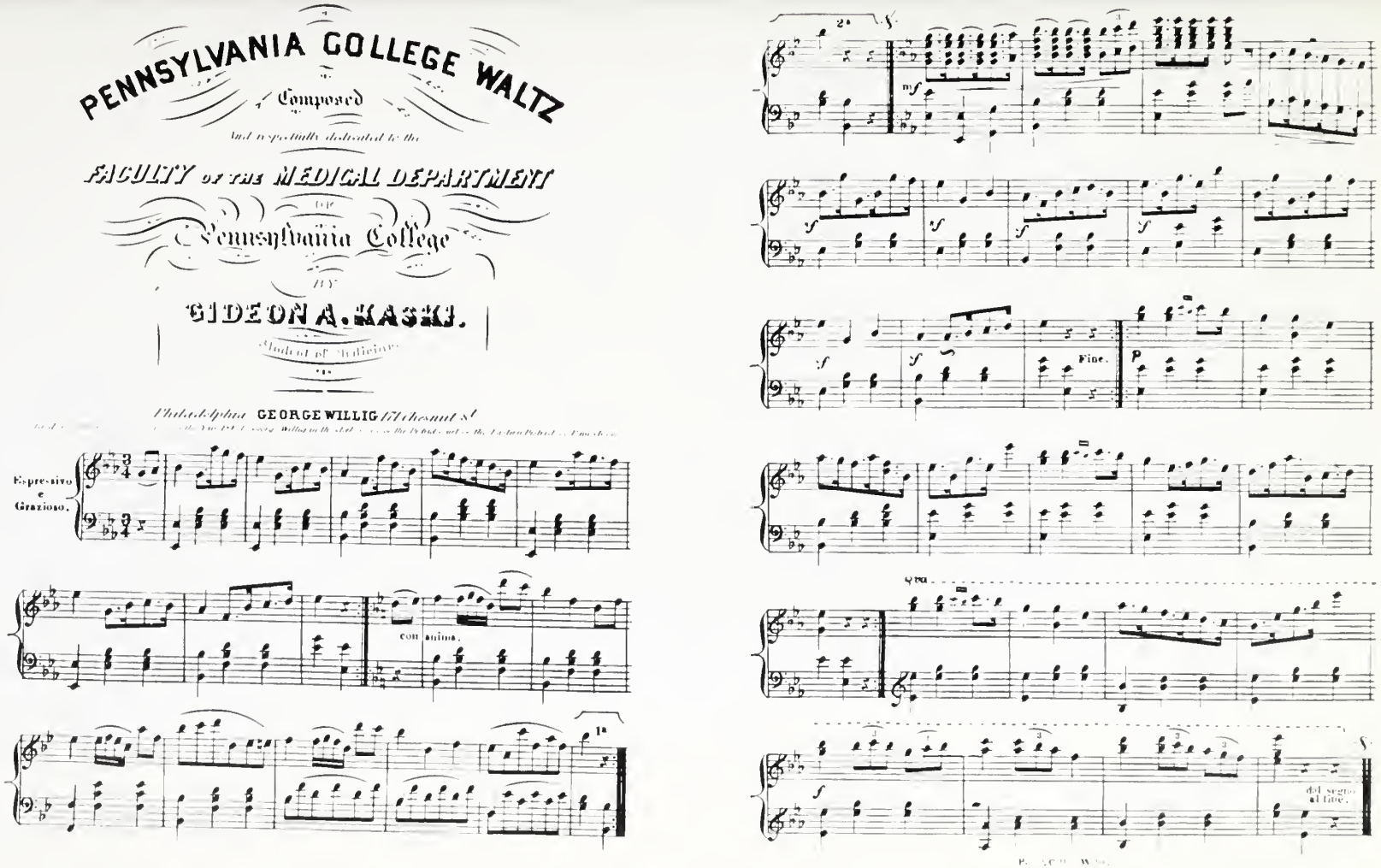

FIG. 1. Opening measures of the "Pennsylvania College Waltz", composed by Gideon A. Kaski, a matriculate at the Medical Department of Pennsylvania College in the college years 1845–6 and 1846–7, and dedicated by him to the Medical Faculty. Reproduced from an original copy in the library of the College of Physicians of Philadelphia.

bill for unpaid taxes was met by the shifting of responsibility from one to another place. The professors, viewing the entire matter as hopeless, resigned. The struggle for existence of more than a score of years went down to defeat. Two later efforts to revive the school were unavailing.

II. CURRICULUM

The following branches were taught: Anatomy, Physiology, Histology, Chemistry, Materia Medica and Pharmacy, Theory and Practice of Medicine, Principles and Practice of Surgery, Midwifery and Diseases of Women and Children, (Practical Anatomy, Clinical Medicine, Clinical Surgery, Toxicology and Pathology were included). The courses ran for four and one-half months (19 weeks), without intermission,[4] and the student was required to attend six lectures daily except on clinic days. Examinations were held daily or weekly for purposes of review, emphasis, or correction of errors, due to misunderstanding by the student of what he had heard in the lectures.

III. (A) FACULTY

Sessions of 1839–40, until 1842–43, inclusive

Samuel G. Morton, M.D., Professor of Anatomy and Physiology.

George McClellan, M.D., Professor of the Principles and Practice of Surgery.

Samuel Colhoun, M.D., Professor of Materia Medica and Pharmacy.[5]

William Rush, M.D., Professor of the Theory and Practice of Physic.

Samuel McClellan, M.D., Professor of Obstetrics and Diseases of Women and Children.

Walter R. Johnson, M.A., Professor of Chemistry.

Thomas R. Colhoun, M.D., Demonstrator of Anatomy (1842).

[4] Theory and Practice of Medicine 100, Obstetrics 75, Materia Medica 75, Anatomy and Physiology 110, Chemistry 75, Surgery 75, lectures.

[5] Dr. Colhoun died in 1841 and was replaced in that year as Professor of Materia Medica and Pharmacy by Robert Montgomery Bird.

Sessions of 1843–44, until 1851–52, inclusive

William Darrach, M.D., President, Professor of Theory and Practice of Medicine.

John Wiltbank, M.D., Registrar, Professor of Obstetrics and Diseases of Women and Children.

William R. Grant, M.D, Professor of Anatomy and Physiology.[6]

Henry S. Patterson, M.D., Professor of Materia Medica and Pharmacy.

David Gilbert, M.D., Professor of the Principles and Practice of Surgery.

Washington L. Atlee, M.D., Professor of Medical Chemistry.[7]

William H. Gobrecht, M.D., Demonstrator of Anatomy (1851–52).

James Hunter, M.D., Demonstrator of Anatomy (1850–51).

A. F. McIntyre, M.D., Demonstrator of Anatomy (1848–49).

Sessions of 1852–53, and 1853–54[8]

William Darrach, M.D., Professor of Theory and Practice of Medicine.

John Wiltbank, M.D., Professor of Obstetrics and Diseases of Women and Children.

Henry S. Patterson, M.D., Professor of Materia Medica and Therapeutics.[9]

David Gilbert, M.D., Professor of Principles and Practice of Surgery.

John J. Reese, M.D., Professor of Medical Chemistry and Pharmacy.

J. M. Allen, M.D., Professor of Anatomy.

Francis G. Smith, M.D., Professor of the Institutes of Medicine.

William H. Gobrecht, M.D., Demonstrator of Anatomy.

Sessions 1854–55 until 1858–59, inclusive

David Gilbert, M.D., Professor of Obstetrics and Diseases of Women and Children.

[6] Deceased March 28, 1852.

[7] Resigned December 23, 1851.

[8] The order of the names of the members of the Faculty as given here was by resolution of the members on May 17, 1852.

[9] Dr. Patterson resigned and became Emeritus Professor. He was replaced by John B. Biddle in 1853.

Alfred Stillé, M.D., Professor of Theory and Practice of Medicine.

John Neill, M.D., Professor of Principles and Practice of Surgery.

J. M. Allen, M.D., Professor of Special and Surgical Anatomy.[10]

John J. Reese, M.D., Professor of Medical Chemistry and Pharmacy.

John B. Biddle, M.D., Professor of Materia Medica and Therapeutics.

Francis G. Smith, M.D., Professor of Institutes of Medicine.

William H. Gobrecht, M.D., Prosector to the Professor of Surgery (1854).

Joseph Shippen, M.D., Demonstrator of Anatomy (1855).

H. W. DeSaussure Ford, M.D., Demonstrator of Anatomy (1856).

J. Frank Bell, M.D., Demonstrator of Anatomy (1858–59).

J. H. B. McClellan, M.D., Professor of Special and General Anatomy (1858–59).

Faculty Sessions of 1859–60, and 1860–61

B. Howard Rand, M.D., Dean, Professor of Medical Chemistry.

Henry Hartshorne, M.D., Professor of the Theory and Practice of Medicine.

Lewis D. Harlow, M.D., Dean, Professor of Obstetrics and Diseases of Women and Children.

William S. Halsey, M.D., Professor of the Principles and Practice of Surgery.

William Hembel Taggart, M.D., Professor of Materia Medica and Therapeutics.

James Aitken Meigs, M.D., Professor of the Institutes of Medicine.

William H. Gobrecht, M.D., Professor of Anatomy.

Theodore A. Demmé, M.D., Demonstrator of Anatomy.

III. (B) ALPHABETIZED LIST OF MEMBERS OF THE FACULTY

(*For Faculty grouped by year, see previous pages*)

Allen, J. M., M.D., 1852–56.

Atlee, Washington L., M.D., 1843–51.

[10] Dr. Allen resigned in 1856 and was replaced by Dr. T. G. Richardson, of Louisville, Ky.

Bell, J. Frank, M.D., 1858.

Biddle, John B., M.D., 1853–59.

Bird, Robert M., M.D., 1841–43.

Colhoun, Samuel, M.D., 1839–41.

Colhoun, Thomas, M.D., 1842.

Darrach, William, M.D., 1843–54.

Demmé, Theodore A., M.D., 1859–61.

Ford, H. W. DeS., M.D., 1856.

Gilbert, David, M.D., 1843–59.

Gobrecht, William H., M.D., 1851–61.

Grant, William R., M.D., 1843–52.

Halsey, William S., M.D., 1859–61.

Harlow, Lewis D., M.D., 1859–61.

Hartshorne, Henry, M.D., 1859–61.

Hunter, James, M.D., 1850.

Johnson, Walter R., M.A., 1839–43.

McClellan, George, M.D.,[11] 1839–43.

McClellan, J. H. B., M.D., 1858.

McClellan, Samuel, M.D., 1839–43.

McIntyre, A. F., M.D., 1848.

Meigs, James A., M.D., 1859–61.

Morton, Samuel G., M.D.,[12] 1839–43.

Neill, John, M.D , 1854–59.

Patterson, Henry S., M.D., 1843–53.

Rand, B. Howard, M.D., 1859–61.

Reese, John J., M.D., 1852–59.

Richardson T. G., M.D., 1856.

Rush, William, M.D., 1839–43.

Shippen, Joseph, M.D., 1855.

Smith, Francis G., M.D., 1852–59.

Stillé, Alfred, M.D.,[13] 1854–59.

Taggart, William H., M.D., 1859–61.

Wiltbank, John, M.D., 1843–54.

IV. TEXTBOOKS USED

Anatomy

Wilson's, Wistar's, Morton's, Smith and Horner's *Atlas*, Carpenter's, Dunglison's, Kirke's *Physiology*, Masse's *Atlas*—until 1852.

[11] Noted for his proficiency as a surgeon. He was the father of General George B. McClellan, of Civil War fame.

[12] Author of a text-book on anatomy and well known as a craniologist: contributor to the famous "Types of Mankind," by Nott and Glidden.

[13] Noted for his "great professional and literary ability."

Many other professors on this faculty won distinction, as did the students whom they trained at this school.

Allen's, Morton's, Sharpey and Quain's, Cruveilhier's, from 1852 until 1854.

Same as 1852, with *Neill's Plates* added, from 1854 until 1856.

Same as 1852, with *Dublin Dissector* added, from 1856 until 1858.

Wilson's (edited by Professor Gobrecht), Gray's *Descriptive Anatomy*, Cruveilhier's, Allen's *Dissector's Guide*, from 1859 until 1861.

Medical Chemistry

Fownes's, Simon's *Chemistry of Man*, *Christison on Poisons*—until 1852.

Graham's, *Taylor on Poisons* were added to those used until 1854.

Regnault's, Bird on *Urinary Deposits* were added, from 1854 until 1856.

Bowman's was added, and Regnault's abandoned, from 1856 until 1859.

Rand's, Fownes's, Lehman's, from 1859 until 1861.

Materia Medica

Eberle's *Therapeutics*, U. S. Dispensatory, Pereira's *Materia Medica*.

Griffith's *Medical Botany*, Ballard's and Garrod's, until 1854.

Only the U. S. Dispensatory and Pereira's *Materia Medica* were retained, and Biddle's *Review of Materia Medica* added, from 1854 until 1859.

Same as for 1854–1859, except substitution of Wood's Therapeutics for Biddle's Review of *Materia Medica*, from 1859 until 1861.

Institutes of Medicine

Carpenter's *Human Physiology*, Kirke's and Paget's, or Reese's *Physiology*, Williams' *Principles of Medicine*, Guy's *Forensic Medicine*, Taylor's *Medical Jurisprudence*, until 1854.

Same as until 1854, except that Guy's *Forensic Medicine* was abandoned in 1855 and Wharton and Stillé's *Medical Jurisprudence* was added, from 1854 until 1859.

Paget's, Reese's, Williams' were abandoned, and, in addition to Carpenter's, Kirke's, and Taylor's, Dalton's *Treatise on Human Physiology*, and Peaslee's *Human Histology* were added from 1859–1861.

Obstetrics and Diseases of Women and Children

Dewees', Lee's, or Ramsbotham's *Midwifery*; Ashwell on *Diseases of Females*, Condie on *Diseases of Children*, Rigby's (until 1851); Beck (in 1846), Meigs (added in 1851) until 1859.

(Churchill's *Diseases of Women* added in 1854; Lee abandoned in 1855.)

Ramsbotham's, Miller's, Churchill's *Diseases of Women*, Colombat's, Bennett's, Churchill's *Diseases of Children*, West, Condie, Meigs, from 1859 until 1861.

Theory and Practice of Medicine

Eberle's or Watson's *Practice of Medicine; Fordyce on Fever*.

Broussais' *Chronic Phlegmasiae*, Andral's *Clinic*, *Hall on Diagnosis*, until 1854.

Watson's, Wood's, Bell and Stokes, from 1854 until 1859.

Wood's, Watson's, Hartshorne's *Medical Principles*, from 1859 until 1861.

Williams' in 1859–60 only.

Principles and Practice of Surgery

McClellan's, Miller's, Ferguson's, Druitt's or Skey's *Surgery; Darrach on the Groin*, Maclise's *Surgical Anatomy* (used in 1850 only), Liston's *Surgery* (used in 1850 only), Cooper's *Outlines* (used in 1850 only), South's *Chelius* (abandoned in 1849)—until 1854.

Perrie's *Surgery* (by Neill), Miller's *Principles and Practice of Surgery*, Erichsen's, McClellan's, Paget's *Surgical Pathology*, from 1854 until 1859.

Miller's, Erichsen's, Druitt's, from 1859 until 1861.

LIST OF MATRICULATES AND GRADUATES OF THE MEDICAL DEPARTMENT OF PENNSYLVANIA COLLEGE

The letters M.D. indicate that the degree of Doctor of Medicine was conferred by the Medical Department of Pennsylvania College in the year stated immediately following the degree. If, however, M.D. is enclosed in paren-

theses, i.e. "(M.D.)," neither the date nor the school which conferred the degree is known. The absence of M.D. after a name is to be taken to mean that available records show only that the person named was a matriculate in the year or years given. The school year began in the Fall and ended in the following Spring, so that for matriculates, " '50 " would mean the school year from Fall, 1850, until the following Spring, 1851. Thus " '50, '51", would mean two school years, 1850–1851 and 1851–1852. Any years stated after the first date following the "M.D." means that the holder of the degree spent that time in the school subsequent to the conferring of the degree, presumably as a post-graduate. Parentheses around a letter indicate that existing records show variant spellings, and the possibility that two different persons might be involved cannot be ruled out with certainty.

Examples:

1. Doe, John, '50—Matriculate, college year 1850–1851.
2. Doe, John, '50, '51—Matriculate, years 1850–1851 and 1851–1852.
3. Doe, John, M.D., '51—Degree conferred by Medical Department of Pennsylvania College in 1851.
4. Doe, John, (M.D.) '51—Did post-graduate work at the Medical Department of Pennsylvania College in college year 1851–1852, but year and college which conferred M.D. degree are not on record.
5. Doe, John, M.D., '51, '52, '53—M.D. degree conferred by Medical Department of Pennsylvania College in 1851. Did post-graduate work there in years 1852–1853, and 1853–1854.
6. Doe, John, '55 (M.D.) '58—Matriculate in 1855, source of M.D. degree unknown, and returned to Medical Department of Pennsylvania College for post-graduate work in 1858.

Honorary degrees are so indicated. Holders of the M.D. degree who were "ad eundem" are also so symbolized.

Most of the documents from which the data for this list are drawn have been assembled by the Library of the College of Physicians of Philadelphia. The National Library of Medicine, at Bethesda, Md., the libraries of the Historical Society of Pennsylvania, Jefferson Medical College, The New York Academy of Medicine, and The Boston Medical Library also have holdings on this medical school.

It has, to date, not been possible to locate the names of matriculates for the academic years 1843–44 and 1860–61, nor of those of the graduates of 1854.

Adams, Henry F., '59
Adams, Samuel, '52, '53
Adams, William, M.D., '59
Adolphus, Joseph F., M.D., '49
Agnew, William B., M.D., '52
Aiken, George N., '42
Akens, Robert K., '53
Akley, B. F., '59
Albright, Chester E., '52, '53
Albury, William, M.D., *ad eundem*, '59
Alden, Charles Henry, M.D., '58
Alden, Henry F., '42
Alexander, Thos. W., '51
Allchin, William, M.D., '53
Alleman, Frederick O., M.D., '53, '53, '55, '57
Alleman, Horace, M.D., '47
Allen, J. G. (M.D.), '57
Allen, Myron O., M.D., '54, '54
Allen, Nathan, M.D., '41
Alter, Benjamin F., M.D., '45
Anderson, James, '42
Andrews, John R., M.D., '40
Appelbaugh, John J., M.D., '41
Appelbaugh, William R., '40
Armstrong, James A., '59
Armstrong, James M., '42
Arnold, Edmund, '42
Ash, John, M.D., '51
Atkinson, James, '50, '51
Atlee, John L., M.D., '53
Auspach, F. M., '40
Austine, Benjamin, M.D., '57
Awl(l), Robert H., M.D., '42, '46

Babb, William T., M.D., '45
Bachman, Gabriel, M.D., *ad eundem*, '61

Backhus, C. W., M.D., '61
Baehr, John L., M.D., '61
Baer, Charles A., '56
Baer, Emannuel S., M.D., '40
Baer, Reuben N., M.D., '41
Bagg, Moses M., '40
Baggs, T. G., '51
Bailey, E. T. (M.D.), '58
Bailey, George P. (M.D.), '55
Bailhache, Preston H., M.D., '57
Baily, E. J. (M.D.), '53
Baily, Joseph C., M.D., '56
Bair, William B., M.D., '54, '54
Baker, Benjamin N., M.D., '57
Baker, Edward L., M.D., '40
Baker, J. H. (M.D.), '58
Baker, John J., '47, '48, '49, '50
Baker, William B., M.D., '46
Baldwin, H. S., M.D., *ad eundem*, '59
Barber, John M., '50
Bare, Adam, '42
Barker, Charles H., M.D., '54, '54
Barnitz, C. S., M.D., '53
Barnitz, J. Warren, '55
Barrett, Henry W., '44
Barrick, Samuel Davis, '44, '45, '54
Barrow, John, '49
Barry, William A., M.D., '45
Bartine, O. H., M.D., '59
Bartram, Thos. Shipley, M.D., '59
Bastian, John C., M.D., '49
Batdorf, Levi D (G)., M.D., '56
Bates, Ira, M.D., '48
Battle, Lee W., M.D., '59
Baugher, Nesbitt, '54
Bayard, John T., M.D., '58
Baynton, John C., '42
Bean, Joseph, '50, '51
Beard, J. T. (J) (M.D.), '56, '58
Beatty, James, '50
Beaver, Llewellyn D., M.D., '41
Beaver, William K., M.D., '57
Bechtel, Joseph Y., M.D., '56
Beck, Charles S., M.D., '53
Beckley, L. B., '54
Bee, R. A. Newton, '49
Beecher, George B., M.D., '59
Beidler, Daniel, M.D., '45, '50
Beidler, Jacob H., '51
Beigle, Daniel, M.D., '42
Bell, B. W., M.D., *ad eundem*, '59
Bell, J. Frank (M.D.), M.D., '57
Bennett, A. D., M.D., '60
Berens, Joseph, M.D., '41
Berky, R. B., M.D., '49
Berrie, Elijah J. (M.D.), '52
Berrie, Henry C., M.D., '53, '53
Bertolet(te), Joseph J (G, T)., '51, '52, '53
Best, David, M.D., *ad eundem*, '59
Beveridge, Thomas T., '59
Beyard, George B., '57
Biddle, David W., '50
Biddle, James H., '50
Billups, H. C., '53
Binkley, John T., M.D., '53
Black, William, (T. J.) M.D., '57
Blackfan, B. Rush, M.D., '50
Bladen, William T., M.D., '53, '54, '56, '57
Blair, David O., M.D., '53
Blake, Robert W., '40
Bland, D. Webster, M.D., '57
Blaser, Christian, M.D., '47
Bloom, Frederick G., M.D., '47
Bockius, S. Atlee, M.D., '61
Bond, Thomas J., M.D., '48, '56, '57
Bonde, John K., '56
Bonsall, William R., '51, '52, '53
Boone, Samuel S., M.D., '51
Bossler, S. Stine, '57
Bostwick, T. M., M.D. *ad eundem*, '59
Boucher, James H., '54, '55
Bournos, Touzia, '40
Boutelle, N. R. (M.D.), '54
Bowen, L. Wells, M.D., '48
Bower(s), John, M.D., '47
Bowe(r)s, Manning F., M.D., '59
Bowlby, Luther C., '51
Bowler, G. W., '59
Bowman, Edward J., (Edmund), M.D., '55
Bowman, Henry B., M.D., '55
Bowman, Isaac, M.D., '40
Bowman, Jacob, M.D., '41
Boy, B. H. (M.D.), '55
Boyle, William H., '57
Brady, John, M.D., '56, '57
Brandes, C. G. Theodore, M.D., '61
Brandon, Spencer G., M.D., '57
Braswell, William M., '59
Bresee, William R., '42
Brewster, Charles G., '44, '45
Brewster, William, M.D., '51
Brickett, George E. (M.D.), '54
Briggs, J. F., M.D., '61
Bright, William S., M.D., '41
Brobst, Edward, M.D., '53
Brobst, J. A., M.D., '57
Brolasky, Joseph P. (M.D.), '52, '54
Bronson, Rev. William White, '52
Brooke, Enos L., M.D., '48
Brotherton, James R., '45
Brotherton, James, M.D., '46
Brown, C. P., '55
Brown, George A., M.D., '52
Brown, H. James, M.D., '41

Brown, J. H., M.D., '52
Brown, Isaiah H., '50, '51
Brown, J. Gilbert L., '49
Brown, Robert F., '53
Brown, R. H., M.D., '57
Brown, R. M., '40
Brown, S. Townsend, '52
Brown, T. Clowes, M.D., '60
Browne, C. H. (M.D.), '55,
Brubaker, D. M., M.D., '59
Bryan, John W. (M.D.), '59
Bryan, William, M.D., '49
Bryant, William F., '40
Bucher, Alfred V., M.D., '55, '56
Bucher, Isaac R. (J), M.D., '57
Bucher, Saml. R., M.D., '49
Budd, John H., M.D., '55, '55
Buehler, Luther R., '58
Buffington, M. M., '40
Burgess, Aaron A(H)., M.D., '59
Burkleo, Henry, M.D., '47
Burmeister, F. F., M.D., '60
Burns, William H., M.D., '53
Burpee, David, M.D., '51
Burr, Nelson, '42
Burt, J. L. (M.D.), '52
Burton, Edmund W., M.D., '51, '52, '57
Butcher, B. F., M.D., '61
Butcher, Charles, M.D., '44
Butcher, Samuel, '59
Byrd, Harvey L., M.D., '40
Byrn, Montgomery T., '46

Cady, C. E. (M.D.), '59
Cake, Isaac M., '51
Caldwell, DeWitt C. B., M.D., '44, '45
Caldwell, H. Clay (M.D.), '52, '53
Calhoun, David A. J., '54, '55
Calwell, George W., '48
Cameron, Charles H., M.D., '44
Cameron, Rev. John, '45
Canfield, Ira D., M.D., '57
Capwell, Albert M., '53
Carl, David, '58, '59
Carl, George D., M.D., '55
Carlisle, William W., '55
Carpenter, Henry, M.D., '41
Carradine, James S., M.D., '58
Carroll, William Joseph, M.D., '55
Carter, Charles T., '42
Carter, Horace M. M.D., '57
Carter, Robert (M.D.), '56
Carter, William E., M.D., '60
Case, William A., M.D., '53
Cassel, Jacob K., M.D., '61
Castles, Joseph, '44
Cathrall, Eugene, '58
Caverley, A. M., M.D., *ad eundem*, '59
Chamberlain, George J., M.D., '50
Chandler, Swithin, '52, '53
Charlton, John, '42
Chase, James M(W)., M.D., '59
Chase, R. Y., '59
Chatham, Benjamin F., M.D., '46
Cheatham, A. D., M.D., *ad eundem*, '59
Chester, John, '49
Childs, B. F., '58
Christ, Levi M., M.D., '57
Christian, Robert, '47
Christian, Robert A., M.D., '51
Chritzman, Henry G., M.D., '59
Claridge, W. R., M.D., '60
Clendaniel, William (M.D.), '52, '55
Clewson, Edmund, '50
Clingan, Charles M., M.D., '41
Clingman, H. P., M.D., '41
Closson, A. L., '51
Clower, William P., M.D., '55
Coates, Elmer R., '56
Coates, Louis M., M.D., '50
Colcord, George W., '40
Cole, Sephus, M.D., '53
Coleman, Amos G., M.D., '60
Collins, Matthew Grier, '50
Colwell, George W., '54
Connell, Charles P., M.D., '60
Conrad, Isaac C., M.D., '60
Converse, Julius M., '40
Cook, Lewis, '42
Coon, J. M., '42
Cooper, Harvey S., M.D., '52, '53
Cooper, Jacob C., M.D., '49
Copp, J. M. (M.D.), '54
Costen, Isaac T., M.D., '57
Coultas, Harlan, '56
Coulter, John S., '42
Covode, Joseph, M.D., '49
Cowgill, Clayton A., M.D., '46, '46
Coxe, Marcellus, '40
Craig, James W., '48
Crawford, J. Agnew, '44
Crawford, John, '56
Crayton, S. P., '42
Cresler, Alonzo L., M.D., *ad eundem*, '61
Creveling, P. G., M.D., '58
Crew, James H., '56
Crisman, A. Jackson, '52
Crispenn, D. D., '42
Crossfield, Luttillet, '57
Crouch, Daniel O., M.D., '58
Crow, Calvin A., '52
Cunningham, Elijah W., M.D., '48
Currier, George, M.D., '51, '51
Curtis, Josiah, '42

Curtis, Levi, '40
Cuthbert, James N., '42

Daggett, C. R., '55
Danenhower, Joseph W., M.D., '53, '53
Daniel(s), William H., M.D., '53
Darrach, Barto White, M.D., '53
Darrach, George Munro, M.D., '50, '50, '52
Darrach, James, M.D., '52
Davidson, Asher, M.D., '48
Davidson, Benjamin, '42
Davis, George W., '47
Davis, Levi, S., '42
Davison, Francis B., M.D., '53
Day, Benjamin J., M.D., '56
Dayton, Samuel N., '42
Deakyne, A. Clark(e), '51 '52, '53
Dean, James S., '58
De Bruneville, James (M.D.), '57
De Hay, R. B., M.D., *ad eundem*, '59
Deisinger, Jonas, '58
Dellinger, Frederick D., M.D., '46, '51
Delong, Daniel (David) R., M.D., '57
Dennis, Stephen P., M.D., '56
Deppen, Darius D., M.D., '53, '53, '58
Deppen, James R., '58
Derr, William M., '46
Dersham, Moses H., '51, '51
Deshler, Edwin J., M.D., '53, '56
Detweiler, C. H. M., M.D., '42
Detweiler, Ephraim, '47, '48
Dever, Joseph, '59
DeWitt, William Francis, M.D., '58
DeYoung, Horace, M.D., '61
Dickson, Franklin M., '48
Dickson, S. Roberts, '45
Dillard, J. S., M.D., '58
Dilts, Jacob, '59
Dixon, Franklin M., '49, '50
Dow, John O. (M.D.), '52
Dowlin, James P., M.D., '61
Dowling, James, M.D., '45
Draper, George L., '42
Drown, Thomas M., '59
Dry, Benjamin E., M.D., '57
Drysdale, Thomas (Franklin) M., M.D., '51, '52, '53
Dungan, J. (M.D.), '55
Dungles, Henry (M.D.), '54
Dunlap, Rufus, '57
Durburrow, George A. (Rev.), '48
Durgin, E. S., '52, '53
Durham, Isaiah D., M.D., '60
Du Val, E. R., M.D., '58
Dykes, William M., M.D., '60
Dyott, John B., '42
Dysart, Benjamin G., '57
Dysart, William P., '57

Earle, Alfred, M.D., '46
Earp, Horatio, '42
Easton, Alexander, '54
Ebur, Thomas R. L., M.D., '48
Eckelman, F. C., M.D., '61
Eckert, Henry C., M.D., '50
Edwards, James, '45
Ehler, J. Augustus, M.D., '41
Ehrman, Benjamin, '40
Ellegood, Robert G., M.D., '52, '54, '56
Ellegood, William T., '58
Elliot, Thomas, '42
Elliott, Samuel M., '49
Ellis, James, '53
Ellis, J. R., M.D., '60
Ellison, Robert J., M.D., '56
Elsegood, Robert G., '50
Ely, Horace, '49, '55
Emanuel, Louis M., '59
Emery, Boyd, M.D., '57
Em(m)erson, V, M.D., '48, '50, '53, '56
English, Thomas S., '42
Epler, J. V., M.D., '58
Ernst, William S., '47, '48
Essenwein, Julius C., M.D., '61
Estabrooks, William W., M.D., '47, '51
Evans, Barton, M.D., Honorary M.D., '46
Evans, John H., '50
Evans, Joseph R. (M.), M.D., '59
Evans, Lewis B., M.D., '56
Evans, Robert T., M.D., '51
Evans, Samuel P., '42
Evans, William N., '49
Everett, Charles E., M.D., '41

Fagan, H. Marion, M.D., '58
Fahnestock, Edward G., '49, '50, M.D., '51
Fahnestock, Henry A., M.D., '51, '57
Farios, Fermin Gomez, '40
Fassitt, Charles R., M.D., '42
Fenner, David, '51
Ferguson, Robert, M.D., '48
Ferguson, Thomas, '42
de Ferol, Achille Lalung, M.D., Honorary, '45
Ferrili, L. C. (M.D.), '56
Field, Sharps, '49, '50
Figarola, Joseph S, M.D., '61
Filbert, J. C. (M.D.), '54
Filbert, Lewis, M.D., '47
Filbert, Lewis S. (M.D.), '53
Finney, Adam B., M.D., '60
Fishbourn, Isaac (J) P., M.D., '52, '55
Fisher, Daniel G., M.D., '52
Fisher, James A., M.D., '53
Fisher, J. A., '58
Fisher, James (H), M.D., '48
Fisher, Robert, '45

Fisher, William H., '58
Fisk, Marcus L., M.D., '42
Fitch, B. Russell, M.D., '47
Fite, James S. (L.), M.D., '58
Flack, W. C. A. (M.D.), '52
Flaig, Edward, '46
Fleming, A. Wayne, '58
Flentje, Louis, M.D., '48
Flickinger, John, M.D., '50
Flickinger, John S., M.D., '50
Floto, Henry, M.D., '42
Ford, Thomas (B.) J., '52 (M.D.), '56
Forman, Abraham L., '42
Foss, Christian J., '48
Foss, William L., '46, '48
Foster, Thomas A., M.D., '56
Foster, William A., '58
Fraley, W. W., '59
Francis, Stephen L., '42
Frazier, Alexander, M.D., '46
Freas, Henry L., '53
Freas, Horace M., M.D., '55
Freeland, Charles J., '46
Freeman, John H. (M.D.), '40
French, A. G. (M.D.), '54
Freund, John W., '52
Frick, Benjamin M., '40
Fricke, Max, '51
Frishmuth, Jacob, M.D., '61
Frost, Rev. N., '52
Fryer, Franklin, '54
Fullmer, John W., '53
Fundenberg, George B., M.D., '49
Funk, Samuel (G.) J., '55, '56

Gaily, A. Wylie, '50
Galen, Gustavus E., M.D., '57
Gantt, Eli, M.D., '53
Garber, Christian, M.D., '55
Garber, Lawrence B., M.D., '53
Gardiner, William A., M.D., '42
Gardner, James W., M.D., '57
Gardner, Peter H., '44
Garman, Jacob, M.D., '57
Gass, Charles, '58
Gaston, J. B., '54
Gatchell, Jacob C., M.D., '60
Gaudet, Felix, B., M.D., '55, '58
Gauntt, Solomon F., '42
Gayley, Andrew W., '51, '52, '53
Gemmill, J. W. (M.D.), '57
Gerhard, Matthias, M.D., '42
German, Jacob, '55
Gerry, R., '42
Getty, John, M.D., '49
Getzwiller, Joseph, M.D., '57
Gibbes, S. N., '42
Gibbs, A. Judson, '55
Gibbs, John Wilson, M.D., '57
Gibbs, J. W., M.D., '51, '55
Gibbs, Louis R., '51, '52
Gibbs, Weston, W., '56
Gibson, Samuel, M.D., '50
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Gilbert, Edwin D., '49
Gilbert, Rev. E. W., D.D., '47
Gilbert, Franklin, '57
Gilbert, George Monro (M.D.), '50
Gilbert, Humphrey T., M.D., '53
Gilbert, Josephus C., M.D., '53, '54, '55
Gilbert, William Kent, M.D., '52, '52
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Gillespie, Edward, M.D., '45, '51
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Gissy, Charles, '56
Givin, Robert, '59
Gobrecht, William H., M.D., '49, '49, '50
Gominger, William H., M.D., '48, '48
Goodhart, George S., M.D., '49
Goodwin, Samuel B., M.D., '60
Gouley, George F., '51
Gourlay, George, M.D., '44
Grafius, William, M.D., '54, '54
Graham, Henry D., M.D., '49, '50
Graham, Leonidas J., '54
Graham, Nathaniel, '42
Graham, Wm. W., '51
Grant, Roderick, '58
Gray, Alexander R., '52
Grayson, William O., '42
Green, John M., M.D., '44
Greenleaf, Robert P., M.D., '55
Greer, Thomas B., M.D., *ad eundem*, '59
Gregory, Emanuel S., '54
Grey, Michael W., M.D., *ad eundem*, '61
Griffin, P. E., '54
Griffiths, Amos E., M.D., '44, '44
Griffiths, Charles G. M., M.D., '57
Griffiths, J. W., M.D., '42
Griswald, Whiting S., M.D., '44
Groff, C. F., M.D., *ad eundem*, '59, '59
Groff, J. (Israel), M., M.D., '58, '59
Groff, John F., M.D., '61
Groff, Martin, M.D., '40
Groves, W. C., '58, '59
Grumbeir, William, '58
Guettich, Augustus, M.D., '49, '54
Guier, George Jr., M.D., '47, '47
Gunkle, William H., M.D., '51, '51
Guss, Isaac, '59
Guth, Israel J., M.D., '59

Haas, Joseph, M.D., '52
Hafer, William, M.D., '49

Hageman, Lawrence V., M.D., '49
Haines, Alfred C., '42
Haldeman, Edwin, M.D., '41
Hall, Charles H., M.D., '55
Hall, David, M.D., '51, '52, '53
Hall, F. H., '58
Hall, J. Parker, M.D., '54, '54, '55
Hall, T. Hartley, M.D., '59
Hall, Thomas, '40
Hall, William Hansell (M.D.), '53
Hambach, Charles F., '51
Hamilton, G. D., '42
Hamilton, James M., M.D., '51, '51, '52
Hammill, C. (M.D.), '55
Hammill, George A. (M.D.), '55
Hammond, Edward S., '54
Hampton, B. W., M.D., '55
Hance, Edmund (M.D.), '53
Handy, Thomas W., '54
Hanly, William H., '40
Harbach, Abel, '42
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Harder, Henry A., '49
Harper, R. G. Jr., '58
Harris, Douglas, M.D., '57
Harris, Hezekiah, '42
Harris, I. Lewis, M.D., '59
Harris, James M., M.D., '47
Harris, Richard H., M.D., '59
Harris, Robert B., M.D., '53
Harris, William, M.D., '48
Harrison, F. C. (M.D.), M.D., '57
Harrold, J. F. (M.D.), '54
Hartman, William B., M.D., '56
Hartz, John K., M.D., '60
Hartz, Uriah W., '46
Hartzell, Ezekiel, M.D., '47
Hartzell, Jephaniah, '51
Harvey, Amos F., '50
Hasbrook, Thomas, '42
Hassler, John W., '51
Hastings, G. L., '42
Hay, James, M.D., '53
Hay, William G., '52, '53, (M.D.), '56, '58
Haydon, Theophilus, '42
Hayes, J. B., '57, '58
Hayes, Jordan (M.D.), '54
Haynie, S. R., M.D., *ad eundem*, '59
Hays, David Black, M.D., '46, '47
Hayward, Thomas B., '58
Haywood, Thomas B., M.D., '59
Heany, Patrick, M.D., '60
Heckel, Charles A., '52, '53
Heckel, Edward B(K), M.D., '55, '55
Heintzelman, Edwin A., M.D., '49
Heist, Daniel, M.D., '40
Heist, D. L. (M.D.), '47
Heist, John L., M.D., '45
Helffenstein, Edward, M.D., '40
Helffrich, J. H., M.D., '46
Helfrich, Jacob S., M.D., '53
Heller, Max (M.D.), '59
Henderson, James, M.D., '48
Henderson, Samuel, '42
Henderson, William B., M.D., '53, '55
Hendrick, Gustavus, M.D., '56
Henry, Elihu H., M.D., '53
Herbert, Thomas L., '42
Herbst, John E., '52, '53
Her(r)mann, Augustus F., M.D., '61
Hershey, Daniel, M.D., '46, '46, '47
Hertz, Uriah, M.D., '50
Heslip, James, '59
Hesse, Bernard, '57
Hetich, Augustus (M.D.), '40
Hiestand, Andrew M., M.D., '46
Higgins, Archibald A. (M.D.), '54
Hill, Charles M., '55, M.D., '57, '57
Hill, John Lawrence, M.D., '46
Hill, Robert H., '56
Hitch, William S., '56
Hoehling, Adolphus H., '57, '58
Holcomb, Benajah D., M.D., '47, '47
Holcombe, Benjamin T., M.D., '40
Holden, Rufus, M.D., '42
Hollembaek, Henry, M.D., '46
Hollenbush, C. G., M.D., '56, '56
Holleyman, William H., M.D., '41
Hollinshead, Thomas S., M.D., '48, '49
Holman, John B., M.D., '52
Holmes, A., M.D., Honorary, '41
Holmes, A. R. (M.D.), '52
Holmes, John (M.D.), '54
Hombach, Charles F., M.D., '53
Hooks, John H., M.D., '55
Hooper, John Edward, '44
Hoover, Joseph T., M.D., '53
Hoover, M. L. E., '52
Hopkins, Thomas, '42
Hornberger, E. F., M.D., *ad eundem*, '59, '59
Horner, Samuel, S., '40
Horwitz, Phineas J. (M.D.), '52, '55
Hostetter, Abram, M.D., '41
Houghton, Charles W., M.D., '60
Houghton, T. C., '42
Houser, Martin L. E., '47
Houser, William, M.D., *ad eundem*, '59
Howell, George H. (M.D.), '53, '55
Hubbard, Thomas D., M.D., '54, '54
Huber, Henry S., M.D., '46
Huber, John F(T), M.D., '59
Huckel, Jacob, M.D., *ad eundem*, '59, '59
Hudnot, Alexander, '51
Hudson, D. M., '53
Hudson, Edward (M.D.), '53
Hughes, David, M.D., '44

Hughes, Isaac W. (M.D.), '54
Hull, Oliver P., '52, '53
Hull, William H., '46
Hull, W. R., M.D., '58
Hulshizer, Henry (M.D.), '59
Hulshizer, Philip F., M.D., '51, '53
Humphrey, Henry, '40
Humston, N. Q., '53
Hunter, James, M.D., '49, '55
Hunter, Robert J., M.D., '55
Hurst, Christian, '48
Hus(s)man, Frederick C., M.D., '42
Hutchinson, D. W., M.D., '40

Iddings, C. E., M.D., *ad eundem*, '59, '59
Ingham, John E., '53
Ingram, John J., M.D., '41
Ingram, Thomas, M.D., '47, '47
Irvine, Galbraith A., '47

Jackson, Abraham Reeves, M.D., '48, '48, '51
Jackson, E. Boylston, M.D., '52, '53
Jackson, E. Owen, Jr., '54, '55
Jackson, George W., M.D., '61
Jackson, John, '55
Jackson, J. M. B., M.D., '59
Jacobs, Henry, M.D., '51, '55
Jacobs, John N., M.D., '61
Jahraus, John, '45
Janney, William S., '53 (M.D.), '55
Janvier, Olney P., '42
Jaquett, Finnix S., M.D., '54, '54
Jenkins, E. M. (M.D.), '52
Jenkins, Joseph G., M.D., '41
Jenks, D. S., '54
Jennings, R., '59
Jewett, Henry A., M.D., '47
Johns, Allen, Rev., '49
Johnson, Benjamin K., M.D., '61
Johnson, John D., M.D., '46, '48, '52
Johnson, J. (John Midgly), '40, '42, '45
Johnson, Mayhew (M.D.), '56
Johnson, M. M., '52, '56
Johnson, S. F., '57
Jones, Abraham S., M.D., '57
Jones, Alfred, '52, '53
Jones, Clement F. Jr., '58
Jones, D. Wentworth, M.D., '61
Jones, John J., M.D., '52
Jones, Morris C., '46
Jones, William H., '42
Jones, William, M.D., '48

Kaempffer, Samuel O., '52, '53
Kalbach, Joseph A., '50
Kam(m)erly, Christian E., M.D., '47
Kaski, Gideon A., M.D., '47, '48
Katerman, A. B., '50
Kaufman, C. Stoner, M.D., '42
Keating, John, '44
Keefe, Joseph A., '53
Keeler, J. H., M.D., *ad eundem*, '59, '59
Keel(o)er, Samuel R., M.D., '58
Keir, William George, M.D., '60
Keller, Charles, M.D., '61
Kell(e)y, Middleton D., M.D., '51
Kenan, Spalding, M.D., '59
Kendall, John B., M.D., '45
Kenderdine, Robert S. (M.D.), '54
Kennedy, H. K., M.D., '59
Kennedy, James S., M.D., '44
Kennedy, Thomas F., '49
Kenworthy, Charles J., M.D., '48
Kern, Benjamin J., M.D., '41
Kern, Edward M., '52
Kerr, Henry M., '56
Kerr, John G. (M.D.), '57
Ketcham, Frederick, '44
Kier, William, '57
Kimball, J. Pierce, M.D., '55
King, G. H., M.D., *ad eundem*, '59
King, Thomas S., '56
Kinsey, J. C. (M.D.), '53
Kirkendall, George W., M.D., '56
Kirlin, William W., M.D., '57
Kissner, Martin, '57
Kitchen, John S., '54
Kittoe, Edward D., M.D., '41
Klein, John, '49, '50, '51
Kline, Thomas N., '42
Kluge, John P., M.D., '52
Knight, Wm., M.D., '52
Knobel, G. W., M.D., '47
Knorr, Charles, '48
Knorr, C., '55
Knorr, Henry, '52, '53
Knorr, Nathan K., M.D., '48
Knox, James Warner, '54, '55, '57, '58
Knox, Samuel, M.D., '57
Koecker, Leonard R., M.D., '44
Koehler, John G., M.D., '41
Koenig, Amandus O., '52
Koller, Noah, '55
Krebs, Rufus J., M.D., '53
Krebs, William F., M.D., '47
Kreps, David P.(T.), M.D., '57
Krum, George (John) R., M.D., '57, '57

Ladd, Charles K., M.D., '46
Lampen, Michael, M.D., *ad eundem*, '59, '59
Landis, Edmund, M.D., '41
Lane, Alfred A., M.D., '44
Lar(r)ison, George H., '55, '57
Lathrop, John L., '59
Lauber, Martin L., M.D., '48, '50, '50, '56
Lauck, Isaac S., M.D., '42

Lauer, John E., M.D., '46
Laughlin, John R., M.D., '56, '56
Laurimore, James, '45
Lawes, Robert, M.D., '55
Layton, Joseph R., M.D., '46
Layton, Tilghman M. (Masden), M.D., '51
Lazzell, James M. (M.D.), '59
Leavitt, Lyman, M.D., '57
Lechner, Henry A., M.D., '42
Lee, Alfred B., M.D., '40
Lee, W. H., '56
Lefever, Isaac, '44
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Leffers, Richard, M.D., '60
Legge, Josiah W., '56
Leib, Charles, M.D., '49, '50, '55
Leighton, Charles, M.D., '48
Leisenring, Peter S., M.D., '52, '56
Leiser, William, M.D., '48
Leistner, C. Henry, M.D., '45
Le(a)itzel, John B., M.D., '53, '55
Lenher, Levi H., M.D., '44
Leon, Alexis, M.D., '41
Lerch, Jared, M.D., '46, '48, '53
Lestrade, Joseph P., '45, '46
Letterman, J. (M.D.), '58
Letterman, Willie H., M.D., '56, '57
Levengood, James A., M.D., '51, '52
Leveque, Joseph A., M.D., '55
Levergood, James A., '49
Levergood, John, M.D., '47, '47
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Lewie, Solomon R., M.D., '60
Lewis, Alexander, '42
Lewis, Redding, '46
Lewis, Richard, '44
Lewis, T. Newton, M.D., '61
Lina(d)gren, Joh(a)n G., M.D., '58
Linderman, Richard J., M.D., '58
Lineweaver, William G., M.D., '42
Lippincott, Allen, '56
Lippincott, Benjamin, M.D., '52
Lipscomb, M. Q. (M.D.), '58
Lister, James S., M.D., '41
Littlefield, D. W., M.D., '41
Livermore, O. T., '55
Lloyd, Barton C., M.D., '46
Lochman, Luther M., M.D., '52
Lockhead, J. H. (M.D.), '56
Locke, James, M.D., '41
Logie, James, M.D., '47
Long, Abraham S., M.D., '46
Long, John G., M.D., '58
Long, Matthew A., M.D., '42
Longshore, John B., M.D., '46, '46
Longshore, W. R., M.D., '60
Lotz, Joseph R., M.D., Honorary, '41
Lowber, William (M.D.), '52, '56
Low(e), Elisha W. M., M.D., '57
Lowndes, Charles (M.D.), '56
Lucket, F. E. (M.D.), '57
Luckie, James B., M.D., '55
Luden, J. Bernard (M.D.), '44
Luzenberg, Edward C., M.D., '46, '46
Lybrand, William C., M.D., '60
Lyons, John C., M.D., '54, '54, '55
Lyons, Joseph B., M.D., '57
Lyons, William, M.D., '56

Macdonald, Archibald, M.D., '48
Machado, Francisco M., M.D., '61
Macnair, William T., '54
Magnin, Jules, M.D., '61
Malin, David (Rev.), '48
Mallory, Henry W., '48
Malone, Peter W., M.D., '46
Mann, Joseph H., '54
Markley, George H., M.D., '58
Marlin, Henry S. (Keisey), '52, '53
Marr, William H., M.D., '40
Marshall, David B., '42
Marshall, Jacob, Rev., '49
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Martin, Charles (M.D.), '53, '54
Martin, Thomas S., '44, '45
Mason, H. P., '42
Mason, J. Ritner, M.D., '61
Masser, George W., M.D., '42
Matheson, J. W., '56
Mathew, Charles, M.D., '44
Matlack, J. M., M.D., '61
Matthew, Charles, M.D., '44
Matthews, William R., M.D., '40
Maxwell, William, M. A. S., M.D., '44
Mayer, Edward, '42
Mayer, Henry Smith, M.D., '44
Mayweg, John W. C., '45, '46
McAvoy, John, M.D., '41
McBride, John, M.D., '48
McBride, Milton J., M.D., '40
McCamant, Thomas J., '47
McClellan, J. H. B., '42
McCloskey, James (F)X., M.D., '44
McConaughy, John B., M.D., '47
McCravy, E. R. W., M.D., *ad eundem*, '59
McCray, Elias B., '40
McCullough, William P., '42
McDannald, Samuel, '53
McDermott, Frances V., '55
McDonald, Norman G., M.D., '55
McDonough, Charles, '47
McDougall, Charles E., M.D., '53
McFadden, James, M.D., '54, '54, '55
McFadden, William H., M.D., '52, '52
McGovran, Edward G., M.D., '49
McGuire, Thomas, '55

McInnis, W. G., '57, '58
McIntosh, Alexander, M.D., '58, '58
McIntosh, William Smith, M.D., '42
McIntyre, Archibald F., M.D., '47
McKee, James H., M.D., '61
McKee, John E., M.D., '58
McKee, R. B., M.D., '59
McKeeham, G. B., '45
McKibbin, Thomas, M.D., '49
McKinley, Samuel E., M.D., '48
McKinney, Daniel F., M.D., '59
McKinney, Isaac, M.D., '52, '53
McLane, Charles A., M.D., Honorary, '41
McLane, Joseph, M.D., '41
McMaster, Andrew J., '52
McMeens, Robert, '42
McMicken, Joseph A., M.D., '51, '54
McMonagh, P. R., '58
McMorris, N. Calvin, M.D., '59
McMurray, Wesley, M.D., '48
McMurtrie, George S., M.D., '60
McNeal, Curtis, M.D., '52
McNeil, D. C., M.D., Honorary, '61
McPherson, DeWitt C., '50
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Transactions of the Sections

SECTION ON GENERAL MEDICINE

26 February 1962

METABOLIC BALANCE STUDIES OF A PATIENT WITH FAMILIAL HEPATOLENTICULAR DEGENERATION, TREATED WITH DIETHYLDITHIOCARBAMIDE ("DITHIOCARB"). F. William Sunderman, Jr., M.D., Joseph C. White, M.D.,* and F. William Sunderman, M.D., PH.D. (Discusser: R. W. Manthei, PH.D.*) (*Abstract 1, below*)

THE HEMOLYTIC UREMIC SYNDROME IN CHILDREN. Daniel S. Fleisher, M.D.,* Arthur E. McElfresh, M.D.,* and James B. Arey, M.D. (Discusser: William J. Williams, M.D.*) (*Abstract 2, below*)

RESULTS OF THE PEET SYMPATHECTOMY IN THE TREATMENT OF PREMALIGNANT AND MALIGNANT HYPERTENSION. Vincent W. Lauby, M.D.,* Robert M. Bucher, M.D., and Carmen T. Bello, M.D.* (Discusser: Joseph H. Hafkenschiel, M.D.) (*Abstract 3, below*)

THE SIGNIFICANCE OF CALCIUM PHOSPHATE CRYSTALS IN THE SYNOVIAL FLUID OF ARTHRITIC PATIENTS—THE PSEUDOGOUT SYNDROME. Daniel J. McCarty, M.D.,* James N. Kohn, M.D.* (Discusser: John Lansbury, M.D.) (*Abstract 4, below*)

23 April 1962

STUDIES ON ADRENOCORTICAL INHIBITORS. J. J. Chart, PH.D.,* and H. Sheppard, PH.D.* (Discusser: Bertram J. Channick, M.D.) (*Abstract 5, below*)

THE ELECTROCARDIOGRAPHIC FINDINGS IN LEFT VENTRICULAR HYPERTROPHY AND DILATATION. John W. Lawrence, M.D.,* and Louis A. Soloff, M.D. (Discusser: Calvin F. Kay, M.D.) (*Abstract 6, below*)

ABSORPTION OF FATS AND EXTERNAL PANCREATIC SECRETION. W. Y. Chey, M.D.,* Harry Shay, M.D., and D. K. O'Leary, PH.D.* (Discusser: H. Phelps Potter, M.D.*) *Abstract 7, below*)

POSTERIOR ROTATION OF THE ATRIAL VECTOR: AN ELECTROCARDIOGRAPHIC SIGN OF LEFT HEART FAILURE. Alton I. Sutnick, M.D.,* and Louis A. Soloff, M.D. (Discusser: Leonard S. Dreifus, M.D.) (*Abstract 8, below*)

28 May 1962

ERYTHROPOIETIN AND TESTOSTERONE IN VITRO. Allan J. Erslev, M.D.* (Discusser: William J. Williams, M.D.*) (*Abstract 9, below*)

HUMAN ANTHRAX: CUTANEOUS AND PULMONARY CASES IN PHILADELPHIA, 1951–1961. Fred B. Rogers, M.D. (Discusser: Milton Werrin, V.M.D.*) (*Abstract 10, below*)

SERUM GLYCOPROTEINS IN DIABETES MELLITUS AND ATHEROSCLEROSIS. William S. Frankl, M.D.* (Discusser: Peter T. Kuo, M.D.) (*Abstract 11, below*)

EXPERIENCES WITH THE FIBERSCOPE. Norman N. Cohen, M.D.* (Discusser: Frank P. Brooks, M.D.) (*Abstract 12, below*)

(Joint Meeting with The American Federation for Clinical Research, Greater Philadelphia Chapter.)

SECTION ON MEDICAL HISTORY

15 May 1962

DR. JOSEPH J. WOODWARD AND THE ARMY MEDICAL MUSEUM. Morris C. Leikind, M.S.,* Washington, D.C.

REMARKS ON THE HISTORY OF ANESTHESIA. Austin Lamont, M.D.

A NOTABLE PSYCHIATRIC MEETING, PHILADELPHIA, 1844. Robert E. Jones, M.D.*

SECTION ON OPHTHALMOLOGY[1]

15 March 1962

THE PHACOMATOSES: STURGE-WEBER SYNDROME. A CLINICO-PATHOLOGIC REVIEW. Dana Newton, M.D.* (Discusser: John S. McGavic, M.D.)

* By invitation.

[1] Abstracts of the presentations at this Section customarily appear in the *American Journal of Ophthalmology* and in the *A.M.A. Archives of Ophthalmology.*

Bilateral Retino Blastoma. Francis J. Gilroy, M.D.,* and Philip G. Spaeth, M.D.

Ocular Toxicity of Dimethyl Amino Propyline. George L. Spaeth, M.D.

26 April 1962

The Phacomatoses: von Recklinghausen's Disease. A Clinico-Pathologic Review. Ralph Skowron, M.D.* (Discusser: John S. McGavic, M.D.)

Ocular Changes in the Blood Dyscrasias. P. D. Trevor-Roper, F.R.C.S.,* London, England.

Experimental Sutureless Ocular Surgery. Alan M. Levine, M.D.,* and Richard A. Ellis, M.D.

SECTION ON OTOLARYNGOLOGY[2]

21 March 1962

Auditory Adaptation. Fred Harbert, M.D., and I. M. Young, M.D.* (Discusser: Moe Bergman, PH.D.*)

Leucoplakia as a Precursor of Carcinoma of the Larynx. William A. Lell, M.D. (Discusser: John Conley, M.D.*)

What We Know About the Lymphoid Tissue of the Upper Respiratory Tract. Harry P. Schenck, M.D. (Discusser: Joseph I. Goldman, M.D.*)

(Joint Meeting in Philadelphia of the Section on Otolaryngology, College of Physicians of Philadelphia, and The New York Academy of Medicine.)

SECTION ON PUBLIC HEALTH, PREVENTIVE AND INDUSTRIAL MEDICINE

15 May 1962

Symposium on Atmospheric Pollution and Human Health. Tom F. Whayne, M.D., F. Curtis Dohan, M.D., Raymond Smith, M.P.H.,* and John W. Thomas, M.S.*

(Joint Meeting with Pennsylvania Public Health Association, Region One.)

[2] Abstracts of the presentations at this Section customarily appear in the *A.M.A. Archives of Ophthalmology.*

ABSTRACTS

Abstract 1

Metabolic Balance Studies of a Patient with Familial Hepatolenticular Degeneration, Treated with Diethyldithiocarbamate ("Dithiocarb"). F. William Sunderman, Jr. M.D., Joseph C. White, M.D., and F. William Sunderman, M.D., PH.D., Jefferson Medical College.

Sodium diethyldithiocarbamate (dithiocarb) is a metal-binding agent which forms stable complexes with divalent copper and nickel. Previous studies from our laboratory have demonstrated dithiocarb to be less toxic than dimercaprol or penicillamine, and to be more effective than either of these agents in the treatment of nickel carbonyl poisoning. In the present paper, metabolic balance studies are reported of a 34 year old woman with familial hepatolenticular degeneration (Wilson's disease) who was treated with dithiocarb during a period of five months.

Intravenous administration of dithiocarb in daily dosages of 10 and 20 mg. per kg. of body weight resulted in clinical improvement and increased excretion of copper in urine, but did not reverse the preexisting positive copper balance. Oral administration of dithiocarb in daily dosage of 30 mg. per kg. of body weight produced a 3-fold increase in the fecal excretion of copper, and thereby resulted in negative copper balance.

Treatment with dithiocarb was attended by dramatic clinical response. The patient's neurologic involvement had been so severe that she had been unable to write, to feed herself, to walk, or to speak intelligibly. Following the courses of dithiocarb therapy she became able to speak clearly, to write, and to return to light housework. Kayser-Fleischer corneal rings became much less intense, and measurements of hepatic function returned to the normal ranges.

Abstract 2

The Hemolytic Uremic Syndrome in Children. Daniel S. Fleisher, M.D., Arthur E. McElfresh, M.D., and James B. Arey, M.D. Departments of Pediatrics and Pathol-

ogy, Temple University School of Medicine and St. Christopher's Hospital for Children.

The syndrome of acute renal failure with hemolytic anemia and thrombocytopenia is being recognized with increasing frequency and in our experience is now one of the most frequent causes of acute renal failure in infants and children. The natural history of the illness is still not clear, but it has become evident that recovery is possible.

During the past three years we have seen four such patients. They were all male and were between five months and seven years of age. Two recovered and two died. So-called "burr" erythrocytes were numerous in the peripheral blood in three but were never seen in the fourth, although they were sought repeatedly. In one patient, several normoblasts in the bone marrow assumed the "burr" shape.

The red blood cell survival time was determined by tagging with Chromium 51 in two patients during the acute phase of the illness; the 50 per cent survival time of the erythrocytes was only 8 and 14 days respectively. Repeat studies were performed three months after recovery in one child, at a time when the urinalysis was normal and clinical recovery seemed complete. At this time, 50 per cent survival time was 23 days, or still slightly shorter than is normal. Normal erythrocytes transfused into patients with "burr" cells assumed the same bizarre configuration as those of the recipient. When "burr" cells from one patient were transfused into a normal recipient, their survival time appeared to be normal. Thus, the anemia appeared to result from extraerythrocytic factors acting upon the erythrocytes, from which these might recover when placed in a different environment.

Aliquots of liver and spleen from an infant who had received Cr^{51} tagged erythrocytes were scanned after death. The liver contained four and one-half times the radioactivity that was present in the spleen.

The antihuman antiglobulin test was negative in all patients and there was no rise in the concentration of bilirubin despite the severe hemolytic process which was present.

The platelets were low in all patients despite the presence of adequate numbers of normal appearing megakaryocytes in the bone marrow. Those patients who died had platelet counts as low as 10,000 per cu. mm., while the platelet counts were never lower than 58,000 in the two survivors.

Autopsy material from the two fatal cases revealed strikingly similar changes in the kidneys, with extensive thrombosis and necrosis of glomerular capillaries and of renal arteries and arterioles. Renal biopsy from one of the survivors, obtained during the acute phase of the illness, revealed an increase in the cellularity of some of the glomeruli, with patchy thickening of the glomerular basement membrane. Renal biopsy was performed again in this patient three months after recovery from the acute illness. Electron microscopy at this time revealed proliferation and swelling of the endothelial cells which were sufficient in some areas to occlude the capillary lumens. The foot processes of the basement membrane seemed to be intact.

These experiences give some indication of the variations in the course of the illness as well as the hematologic changes and the pathologic alterations which occur in the kidneys of patients who die, as well as in those who recover.

Abstract 3

RESULTS OF THE PEET SYMPATHECTOMY IN THE TREATMENT OF PREMALIGNANT AND MALIGNANT HYPERTENSION. Vincent W. Lauby, M.D., Robert M. Bucher, M.D., and Carmen T. Bello, M.D., Departments of Surgery and Medicine, Temple University School of Medicine.

Forty-four Peet surgical sympathectomies have been done on patients with premalignant and malignant hypertension at Temple University Hospital since 1953. The bilateral sympathetic chain excision is done in one operative period.

Thirty patients in the series had premalignant hypertension, and fourteen had malignant hypertension.

The premalignant hypertensive patients

were those who, in spite of adequate medical therapy, either demonstrated uncontrolled symptomatic disease or developed cardiac, renal and/or cerebral complications. Fundoscopic examination revealed active disease, the Class III of Keith-Wagner-Barker. The malignant hypertensive patients were true malignant hypertensives, showing the fundoscopic criteria of Keith-Wagner-Barker.

All the malignant and twenty-eight of the premalignant cases had referable symptoms: headache, blurred vision, vertigo, etc. The two asymptomatic patients were operated upon because of renal involvement. Only twelve patients in the entire series were without cardiac, renal, or cerebral complications. Eighteen patients had significant cardiac symptoms. Nineteen had abnormal renal function, eight having BUN's over 30 mgm. per cent—ranging up to 140 mgm. per cent. Eight patients had evidence of recent acute cerebral vascular involvement.

Results of Sympathectomy:

Premalignant Group: There were no operative deaths. At present, twenty patients are living, six are dead and four are lost to follow-up.

Of the twenty living patients, seven had no cardiac, renal, or cerebral complications and are living—one to seven years postoperatively.

Six of the twenty living patients had cardiac decompensation preoperatively and are living one to five years. Their cardiac status has remained stationary or improved.

Five of the twenty patients had impaired renal function, but are living one to five years later with no evidence of further significant decrease in renal function.

Two of the living patients had cerebral complications and are living one and three years later respectively.

All of the living patients, except one, have had complete relief or marked improvement in their symptoms. Evidence of an incomplete sympathectomy has been found in the case of no symptom relief.

Six of the premalignant group are known to be dead. Three patients, two of which had cerebral vascular accidents preoperatively, lived three to four years. Three patients died within one year. All of these had decreased renal function and azotemia at the time of surgery.

Malignant Hypertension Group: Out of fourteen patients, there were two operative deaths, giving an operative mortality of 14.3%.

Ten of the fourteen patients had decreased renal function. Eight patients had BUN's over 30 mgm. per cent, with six between 50 and 140 mgm. per cent. Five of the azotemic patients also had cardiac decompensation and one had sustained a cerebral vascular accident. Only three of the fourteen patients were without evidence of cardiac decompensation, azotemia, or cerebral vascular involvement.

Following surgery, eight of the fourteen patients (57.1%) lived two to six years. Six patients have survived less than two years; one is alive at one year, two were operative deaths, one died at one and one-half years, and two died in less than one year. However, one of the latter deaths was due to an aortogram and not to hypertension.

Following surgery, the severe postoperative symptoms: nausea, headache, visual blurring, etc., have been relieved or markedly improved.

Comment:

Extensive renal studies have been carried out on a series of hypertensive patients. These studies show that hypertensive patients have abnormal renal vasoconstriction under resting conditions. In response to stress the hypertensive patient and the normotensive patient demonstrate renal vasoconstriction, the hypertensive patient appearing to be hyper-reactive to stress. Thus, under stress, the hypertensive patient has additional vasoconstriction superimposed on that already present. In terms of renal blood flow and glomerular filtration, the hypertensive patient starts out with reduced flows and shows further acute reduction in response to stress. His renal reserve, therefore, may be compromised during most of a 24 hour period. When studied following sym-

pathectomy, it appeared that sympathectomy is capable of reducing or abolishing these acute renal responses to stress, without affecting the resting values. Thus, the procedure which effectively and consistently prevented the acute responses to stress might be expected to improve renal function as it exists during normal daily activity.

Conclusions:

The Peet surgical sympathectomy is capable of altering the clinical course of seriously ill hypertensive patients, who, in spite of medical therapy, develop severe symptoms and evidence of cardiac, renal, or cerebral deterioration. This procedure has the advantage of requiring only one operative period. It is indicated in patients with malignant hypertension and in patients whose hypertension becomes active or progressive on medical management, especially if evidence of cardiac, renal, or cerebral complications occur. Azotemia, in itself, is not a contraindication to the operation. There is some evidence that the procedure decreases the rate of renal function deterioration.

Abstract 4

THE SIGNIFICANCE OF CALCIUM PHOSPHATE CRYSTALS IN THE SYNOVIAL FLUID OF ARTHRITIC PATIENTS: THE PSEUDOGOUT SYNDROME. Daniel J. McCarty, M.D., James S. Faires, M.D., and Norman N. Kohn, M.D., Department of Medicine, Hahnemann Medical College and Hospital.

Synovial fluids aspirated from the afflicted joints of 120 arthritic patients were examined for crystalline particles by phase contrast and by polarized light microscopy. In addition to the finding of urate crystals in most gouty synovial fluids, samples from eight patients contained rod-like non-urate crystals. These showed a weak positive birefringence by polarized light and were not digested by uricase. Sufficient material existed in samples from six patients to produce a powder pattern by x-ray diffraction. These patterns were virtually identical. The crystals are felt to represent hydrated calcium phosphate (complex phosphate resembling pyrophosphate) by x-ray fluorescence and infra-red spectrophotometry.

Five of this group of patients presented themselves to us with acute signs and symptoms suggestive of gouty arthritis; one had both acute attacks and chronic monoarticular arthritis, and one had chronic arthritis of both knees. The synovial fluid obtained from the remaining patient, a known gouty arthritic, showed non-urate rods in addition to urate crystals. Six of the patients were negroes, six men and two women; all fluids were obtained from the knees. Serum urate levels were within normal limits in all but the gouty patient. Joint fluid obtained from the acute cases was of the inflammatory type, and the crystals were predominantly intraleukocytic, while those found in the non-inflammatory type of joint fluid from chronically symptomatic joints were extracellular. These were rapidly phagocytosed, however, when they were incubated with normal human buffy coat—suggesting that the chronically afflicted joint had adapted to their presence.

Injection of a suspension of these crystals into the joints of dogs and normal humans produced an acute arthritis resembling the naturally occurring attacks.

Fifty-eight cases of "chondrocalcinosis" have been reported in the world literature to date. Most have had acute arthritis but have been identified as a group by a characteristic roentgenographic appearance—calcified menisci in the knee and/or calcification of the superficial layer of articular cartilage.

Because of the clinical and roentgenographic similarity, we believe that "pseudogout" and "chondrocalcinosis" are the same entity; chondrocalcinosis representing the advanced radiologic findings of pseudogout syndrome.

Abstract 5

STUDIES ON ADRENOCORTICAL INHIBITORS. J. J. Chart, PH.D., and H. Sheppard, PH.D., CIBA Pharmaceutical Company, Summit, New Jersey.

During the past two decades a systematic

TABLE 1

PHARMACOLOGICAL INHIBITORS OF THE ADRENAL CORTEX

A. *Inhibitors of ACTH Secretion*
  I. Steroids: Cortisol and its analogues—feedback mechanism.
  II. Central and autonomic depressants, e.g.:
    a. Most anesthetics (barbiturates, ether, etc.)
    b. Morphine
    c. Phenothiazines
    d. Rauwolfia alkaloids
B. *Agents Which Cause Atrophy of the Adrenal Cortex*
  I. DDD and its isomers (e.g., o,p′-DDD).
C. *Inhibitors of Cholesterol Synthesis*
  I. Δ^4-Cholestenone
  II. Triparanol (MER-29)
D. *Inhibitors of Steroidogenesis in Adrenal*
  I. Amphenone B
  II. Metopirone (Su-4885)
  III. Indenes and tetralones (Su-9055, etc.)
  IV. Thiosemicarbazones
E. *Competitive Antagonists of Aldosterone in Renal Tubule*
  I. Spironalactone, etc.

search has developed for chemical compounds which can alter the function of the adrenal cortex. Various approaches to this problem have been attempted and the major ones are illustrated in abbreviated outline form in Table 1. Studies in our own laboratories have been concerned primarily with Metopirone (1) and the indenes and tetralones (2). The activity of Metopirone is characterized by a sharp decrease in the secretion of cortisol, corticosterone, and aldosterone, and this decrease is accompanied by a rise in the secretion of Reichstein's S and desoxycorticosterone. This selective type of activity is consistent with the activity one would expect from a compound which inhibits the 11-β hydroxylation of steroids. Direct evidence for this type of enzyme inhibition has been published by Liddle *et al.* (3) and this compound has found practical clinical application as a test for pituitary insufficiency.

The indenes and tetralones show adrenocortical inhibition which is quite different from Metopirone. In contrast, they cause a decrease in the secretion of Reichstein's S and an increase in the secretion of corticosterone. Effects on cortisol and desoxycorticosterone are similar to the effects of Metopirone.

The type of activity expressed by the indenes and tetralones would strongly suggest that these compounds are preferential 17α-hydroxylation inhibitors. Further evidence for this hypothesis has been published by Hall and Eik-Nes (4). They observed an inhibition of testosterone synthesis by rabbit testes slices and homogenates. We have also obtained evidence *in vivo* showing that the tetralones block androgen secretion in the rat in response to human chorionic gonadotrophin.

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Abstract 6

THE ELECTROCARDIOGRAPHIC FINDINGS IN LEFT VENTRICULAR HYPERTROPHY AND DILATATION. John W. Lawrence, M.D., and Louis A. Soloff, M.D., Department of Medicine, Temple University School of Medicine.

Electrocardiographic findings were analyzed in twenty-seven subjects with thickened left ventricular walls, and in seven with left ventricular dilatation and a left ventricular wall of normal thickness, as determined by biplane angiocardiography. Only walls 1 cm. or thicker in end-diastole were considered to be thickened. The data were then compared to sets of electrocardiographic criteria for left ventricular hypertrophy as proposed by Gubner and Ungerleider (1), Noth, Myers and Klein (2), Wilson (3), Sokolow and Lyon (4), and Scott (5, 6).

Although our data showed a generally

higher degree of positivity when compared to that of these authors, the left ventricular hypertrophy and the left ventricular dilatation with normal wall groups did not differ from each other in a highly discriminatory manner. However, there is a tendency for those with left ventricular dilatation alone to have lower voltage in the limb leads, higher voltage in the precordial leads, and shorter durations of the intrinsicoid deflection and QRS complexes when compared to those with increased left ventricular wall thickness.

Because of the large overlap between accepted normal tracings and those findings present in both of these groups of abnormal patients, however, other methods of differentiating the normal from left ventricular enlargement may be desirable. To this end, all routine Temple University Hospital electrocardiograms were examined during a 4-month interval. With few exceptions, an intrinsicoid deflection exceeding 0.04 sec. was found only in those with clinical findings that potentially can burden the left heart. We believe that such a finding is unlikely to occur in the normal heart. In addition, the QRS complex duration was greater than 0.08 sec. in 89% of our group with hypertrophy compared to 88% in those with dilatation; greater than 0.09 sec. in 70% of the hypertrophied group compared to 38% in those with dilatation, and greater than 0.10 sec. in 59% of the hypertrophied group compared to 25% in those with dilatation.

Therefore, we feel that a thickened left ventricular wall (or left ventricular dilatation with or without a thickened left ventricular wall) can be excluded with a high degree of reliability if the intrinsicoid deflection in V_6, or in the first left precordial lead with a q, has a duration of 0.04 sec. or less, and if the duration of the QRS complex is 0.08 sec. or less. The longer the QRS duration, the more likely is a thickened left ventricular wall, whereas relatively slight widening of the QRS with high precordial voltage without corresponding limb lead voltage, the more likely is left ventricular dilatation present.

TABLE 1

	R V_6 = 26 mm. or more	I.D. V_6 = .050 sec. or more	QRS 0.10 or 0.11 sec.	T V_6 inverted
Hypertrophy...	19%	52%	52%	56%
Dilatation.....	38%	38%	25%	38%

Finally, the difficulties in distinguishing between myocardial infarction and a thickened left ventricular wall are appreciated.

Soloff (7), in 1950, pointed out that focal block causing delay in the onset of R, with consequent widening of the QRS, was the fundamental finding in myocardial infarction. High voltage associated with the findings of infarction may establish the diagnosis of associated left ventricular enlargement. High degrees of left axis deviation in the absence of high voltage, very wide QRS complexes (longer than 0.12 sec.), and multiple notchings of the QRS, all favor myocardial infarction with or without left ventricular enlargement.

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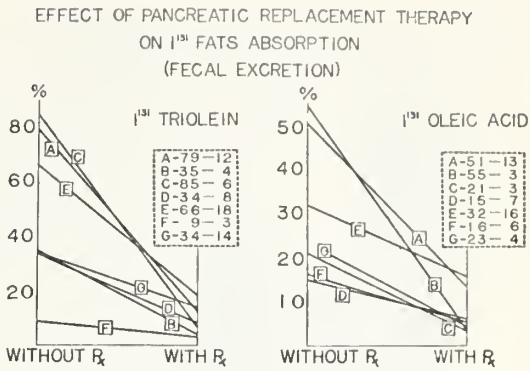
Abstract 7

ABSORPTION OF FATS AND EXTERNAL PANCREATIC SECRETION. W. Y. Chey, M.D., Harry Shay, M.D. and D. K. O'Leary, PH.D., Fels Research Institute and Department of Medicine, Temple University School of Medicine.

We recently reported evidence which indicated that patients with advanced pancreatic disease can develop malabsorption as well as maldigestion of fat (1). This was based on highly abnormal values for the excretion of radioactivity in the stool after the administration of I^{131} Triolein. Other evidence that this absorption defect involved fat was found in the low values for serum Carotene, both before and after Carotene loading. Carbohydrate absorption was not impaired, as indicated by the normal response with d-Xylose and a normal or diabetic glucose tolerance test. The question of whether advanced pancreatic insufficiency cases can develop malabsorption as well as maldigestion of fat has been debated for sometime based both on clinical (1–6) and animal experimental evidence (2, 7–10). In the present studies we have attempted to further clarify this problem by observations in man.

In 51 patients with chronic pancreatic disease, I^{131} Triolein test was performed in all 51 patients and I^{131} Oleic acid test in 32. Twenty-four of the 51 yielded abnormally increased fecal excretion of I^{131} Triolein, and 16 of these 24 showed evidence of malabsorption of I^{131} Oleic acid. There was no malabsorption of carbohydrate by d-Xylose tolerance and oral glucose tolerance tests. X-ray study of the small bowel was normal in all. Upper jejunal mucosal biopsy specimens obtained from 6 of the 16 revealed no organic lesion.

In 7 patients with abnormal results, with both I^{131} Triolein and Oleic acid, the effect of pancreatic replacement therapy was studied. There was striking improvement in absorption of both I^{131} Triolein and Oleic acid in each patient (Figure 1).



In order to clarify further the role of the pancreas in absorption of I^{131} Oleic acid, the following experiments were performed on 4 healthy volunteers, in 3 of whom consistent results were obtained. After an overnight fast, the gastrointestinal tract was intubated with a 3 lumen tube. The tube openings of one were placed along the most dependent portion of the stomach. The openings of the second tube were staggered through the length of meta-duodenum with the last perforation just proximal to the Ligament of Treitz. The tip of the third tube was advanced in the jejunum to approximately 10 inches beyond the Ligament of Treitz. Constant suction of 30 inches of water was applied to the gastroduodenal tubes while instillation of test substances was made through the jejunal tube. Instillation was always made after one hour of gastroduodenal suction, and suction was continued for a 5-hour period thereafter.

At successive adequately separated periods the following experiments were done:

Expt. I. 5–10 cc. of Oleic acid containing 25 μc. of I^{131} Oleic acid mixed in 40 cc. of sodium bicarbonate solution with concentration of 110 meq/L.

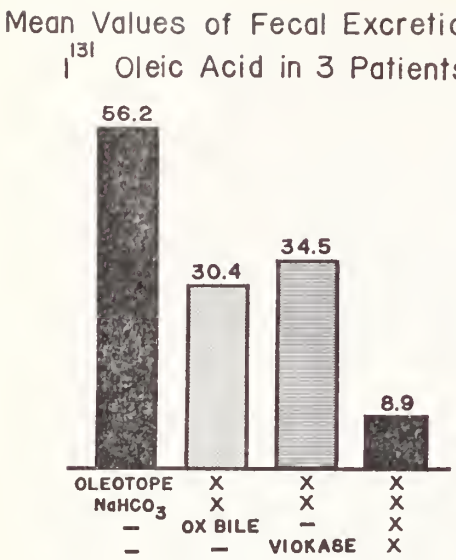
Expt. II. Same as Expt. I. plus 900 mgms. of powdered Ox-bile extract.

Expt. III. Same as Expt. I. plus one gram of powdered Viokase.

Expt. IV. Same as Expt. I. plus 900 mgms. of Ox-bile extracts and one gram of Viokase.

With this technic, fecal excretion of radioactivity was measured for five days.

Continuous removal of gastroduodenal aspirates without administration of Ox-bile



extract or Viokase caused rather marked malabsorption of I^{131} Oleic acid. The absorption rate was improved when either Ox-bile extracts or Viokase was added, and was strikingly improved when both were added (Figure 2).

These clinical and experimental observations strongly suggest an important role of pancreas in absorption of Oleic acid in man.

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Abstract 8

Posterior Rotation of the Atrial Vector: An Electrocardiographic Sign of Left Heart Failure. Alton I. Sutnick, M.D.,* and Louis A. Soloff, M.D., Department of Medicine, Temple University School of Medicine.

Acute left heart failure frequently, if not always, produces left atrial dilatation. Such distention, if clinically recognizable, would be a useful sign of left heart failure—a disorder that may notoriously lack discriminatory findings. This study is undertaken to show that acute changes in the electrocardiographic P waves are useful and perhaps sensitive signs of this disorder.

The electrocardiograms of twenty-six patients with a clinical diagnosis of acute left heart failure were examined to determine if there were any electrocardiographic signs that could distinguish the trace taken during failure from that taken during compensation. In twenty-one (81 per cent), failure was associated with a posterior rotation of the

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mean atrial vector in the horizontal plane, demonstrated by an increase in P wave negativity in V1 or persistence of a negative deflection of the P wave further to the left in the precordial leads.

Several patients demonstrated atrial arrhythmias associated with failure, but these were also accompanied by posterior rotation of the P vector when sinus rhythm was restored. In several traces, increased notching of the P waves was noted with failure. A posteriorly-directed atrial vector was also present in all of these. Many other P waves were distorted by notching or other atrial abnormalities, which were not significantly changed during failure.

Many authors have attempted to correlate the size of the left atrium with various electrocardiographic parameters. Thus, the degree of left axis deviation of the P waves in the frontal plane, the duration and voltage of the P waves, the interval between the peaks of a bifid P wave, and the ratio of the duration of the P wave to the P-R segment have all been suggested as indices of left atrial enlargement. These parameters have been evaluated by Soloff and Zatuchni as possible signs of left atrial enlargement by comparison with biplane angiocardiograms; no correlation was found. We likewise have found these signs to be of no help in the detection of left heart failure. However, a re-inspection of the angiocardiogram data has revealed that an increase in the negativity of the P wave in the right precordial leads correlates with an increase in size of the left atrium.

These observations suggest that posterior displacement of the atrial vector in acute left heart failure is a result of acute left atrial dilatation. Regardless of the mechanism involved, it is an important and reliable electrographic sign of acute left heart failure.

Abstract 9

Erythropoietin and Testosterone in Vitro. Allan J. Erslev, M.D., Associate Professor of Internal Medicine and Associate Director, Cardeza Foundation, Jefferson Medical College.

Two hormones, Erythropoietin and Testosterone, have been shown to stimulate red cell production in vivo. However, their clinical action is so dissimilar that it seems safe to assume that they are of very different physiologic significance. In order to study and compare their individual actions on erythroid tissue attempts have been made to develop an in vitro test system.

The first attempts made to demonstrate an in vitro action of Erythropoietin were unsuccessful. However, the recent availability of highly purified sheep Erythropoietin has made a more sensitive in vitro system possible. In this system Erythropoietin was found to increase the cellular iron uptake of bone marrow cells, an increase which closely reflected an accelerated rate of heme synthesis. It was furthermore shown that Erythropoietin increased the cellular uptake of formate, a substance used almost exclusively in the synthesis of nucleic acids. The uptake was accelerated slightly during the first 21 hours of incubation and more pronounced during the second 21 hours of incubation. Reticulocyte uptake of Fe^{59} was not affected by Erythropoietin.

Testosterone tested in the same system was also found to accelerate the iron uptake, but in a different manner. Here the acceleration took place exclusively during the first 21 hours of incubation and the uptake by reticulocytes was as affected as the uptake by bone marrow cells.

It appears from this study that Erythropoietin may accelerate iron uptake by increasing the number of heme synthesizing cells, while Testosterone acts as an anabolic agent on erythroid cells already present in the suspension. It seems unlikely that the immediate anabolic effect of Testosterone on erythroid cells in vitro has any relationship to the slow development of polycythemia in vivo, while it appears most likely that the proliferating effect of Erythropoietin in vitro

is directly related to its in vivo stimulation of the bone marrow.

Abstract 10

HUMAN ANTHRAX: CUTANEOUS AND PULMONARY CASES IN PHILADELPHIA, 1951–1961. Fred B. Rogers, M.D., Department of Medicine, Temple University School of Medicine.

Anthrax, while still a scourge in some parts of the world, has steadily declined in importance in the United States during the past several decades. About fifty cases of human anthrax are reported annually in this country; additional unreported cases also occur. Practically all diagnosed anthrax is now of the cutaneous form, and deaths from this disease have been rare since the advent of sulfonamides and antibiotics. The incidence in many countries is considerably higher; it has been estimated that from 20,000 to 100,000 human cases occur annually in the world.

Man is infected by contact with infected animals (agricultural anthrax) or contaminated animal products (industrial anthrax). Anthrax in man usually is acquired by accidental cutaneous inoculation, but the bacilli or spores also may be inhaled or ingested. The primary cutaneous lesion (malignant pustule) appears within twenty-four hours after inoculation as a fiery small furuncle on the hands or forearm, the serous discharge teeming with *B. anthracis* on Gram stain. The lesion's center soon changes into a black central necrosis (*charbon*) with an angry edematous areola and spreading eschar with local bubo formation. Without effective therapy, gangrene may occur, sometimes followed by fatal septicemia. Pulmonary infection (wool or rag sorter's disease), a violent pneumonia, is rare and usually fatal. Anthrax bacilli are often found in the patient's sputum before death. Because of the serious illness resulting from inhalation of bacilli or spores, anthrax has been considered as a possible agent for biological warfare.

Agricultural anthrax occurs in farmers, slaughterhouse workers, and veterinarians. Industrial anthrax occurs primarily in persons whose work brings them into contact with contaminated goat hair, carpet wool, livestock skins and hides, or fertilizer bone meal, coming from Asia, North Africa, and Southern Europe. Infection of the face through improperly sterilized shaving brushes and analogous accidents have also occurred. Intestinal anthrax has been reported from primitive areas due to the eating of contaminated animal meat.

Bacillus anthracis is such a large microbe that it was seen in unstained preparations by Davaine and Rayer in 1850. Seven years later Brauell was able to infect animals with blood containing anthrax rods. Koch, in 1877, cultured the bacterium in the aqueous humor of the ox's eye, described its life cycle, and reproduced it in experimental animals—the initial basis for 'Koch's Postulates'. Pasteur and his colleagues attenuated the bacillus by cultivation at a temperature of 42 to 43 degrees Centigrade, thereby preparing a 'vaccine' to practically apply in animals active immunization against a disease. The dramatic experimental demonstration of protection against anthrax in a group of twenty-four sheep, one goat, and six cows, at Pouilly, France, in 1881, was a milestone in immunology and a portent of broad biological possibilities. A purified alum-precipitated protective antigen, recently developed by George G. Wright et al., has made human immunization possible by means of a non-viable anthrax vaccine.

Major emphasis in the control of human anthrax is placed on minimizing contact of man with infected animals or contaminated animal products. Elimination of the disease in animals is an essential measure. Modern immunization methods have produced a marked reduction of incidence. The organisms are hardy, however, remaining viable as spores in soil for many years, and many agricultural areas of the world are heavily contaminated. Industrial disinfection of raw hairs and hides, imported from various countries and sources, is essential, with sterilization by heat and pressure,

washing with soap, water, and formalin. Direct contact of workers should be minimized, plant education of workers stressed, and immunization effected with nonviable preparations.

In addition, adequate ventilation and high standards of cleanliness in the mills seem to play an important role in the control of anthrax. The risk of contracting anthrax is greatest in the early steps in the processing of goat hair and is greater than the risk associated with sheep wool processing. Prolonged exposure to the organism does not appear to lead to the development of subclinical infection or immunity to anthrax. Gaps exist in our knowledge of the epidemiology and transmission of inhalation anthrax; why, for example, some remotely exposed persons succumb, while others in dense contact with the microorganism escape the disease. Enforcement of public health regulations in industry and agriculture requires constant vigilance because of complex social and economic factors which extend beyond the usual confines of human and veterinary medicine.

Seventy-three cases of human anthrax were reported to the Philadelphia Department of Health for the decade 1951–1961; three of these cases proved fatal. The three fatalities were attributed to pulmonary anthrax, the other seventy cases being cutaneous infections. (Other unreported cases are known to have occurred in the Philadelphia area during this period, all probably non-fatal infections.) The chronology on reported cases was: 1951—4 cases, 1 death; 1952—10 cases, 1 death; 1953—8 cases; 1954—10; 1955—6; 1956—10; 1957—3 cases, 1 death; 1958—4; 1959—4; 1960—1; 1961—3.

Case Reports

Three cases of anthrax seen at Temple University Hospital, in 1951, 1955, and 1959, are described below. The first case, fatal pulmonary anthrax, was traced to neighborhood industry exposure, while the other two, cutaneous infections, were occupationally acquired.

K. E., a 37 year old white housewife, was admitted to Temple University Hospital in semi-comatose state on June 30, 1951. Her husband stated that she was in good health until five days prior to admission. At that time she complained of malaise, low fever, and dull pain in the low back and both legs. Symptomatic treatment at home failed to bring relief and two days before admission she was restless, paced the floor, had mild headache and anorexia. She vomited shortly before being brought to the hospital in a lethargic, unresponsive condition.

Her history did not reveal preceding injury, tooth extraction, or recent inoculation. Physical examination showed a toxic patient responding only to painful stimuli. Rectal temperature was 104.6°F., pulse 120, blood pressure 120/68. Her head was deviated to the left and eyes fixed in an upward, lateral gaze. Moderate nuchal rigidity was present, with slight weakness and increased deep tendon reflexes in the left upper extremity. A faint systolic heart murmur was heard. Skin was clear of eruption; abdomen, pelvis, and extremities were negative.

Lumbar puncture disclosed an elevated initial pressure (400 mm. of water). Spinal fluid was turbid, xanthochromic, and contained 4,440 cells per cu. mm.—all neutrophiles. Direct smear of the spinal fluid revealed a profuse number of large Gram-positive bacilli in chain formation. The patient died one hour after admission to the hospital. Pre- and post-mortem blood cultures, and smears from the leptomeninges disclosed large numbers of anthrax bacilli.

Autopsy (A-6717) was performed on the day of death. Positive gross findings included bilateral pleural effusions, moderate ascites, and congestion of the upper lobe of the right lung. The spleen was enlarged, soft, and weighed 450 grams. Mesenteric, retroperitoneal, peritracheal and mediastinal lymph nodes were enlarged, dark red and firm. Meninges were cloudy and blood vessels on the brain surface moderately congested. Several small collections of thick, tenacious exudate were present at the base of the brain. Histologic studies revealed

an interstitial pneumonia and marked reactive hyperplasia of the mediastinal, peritracheal, retroperitoneal, and mesenteric lymph nodes. Dura mater showed an intense inflammatory reaction characterized by focal collections of polymorphonuclear leukocytes. Numerous large, heavily encapsulated, rod-shaped bacilli could be identified within the inflammatory exudate.

Epidemiological investigation by the Philadelphia Health Department revealed that this woman's home was close to two hair-processing factories—the probable source of infection. It was postulated that the anthrax bacilli were introduced into the blood stream and cerebrospinal fluid through inhalation. Respiratory entry was basic to the overwhelming bacillemia, pneumonia and meningitis.

T. P., a 46 year old white male, had worked as a carder at the Puritan Looms Company in Philadelphia for six months. He was in good health until December 29, 1955, when he developed a "sore" on his right forearm and complained of a "cold", nausea and weakness. He vomited once in December 31, the day he came to Temple University Hospital. He had emigrated from Italy during the summer of 1955; having had no previous contact with animal hairs, hides or raw wool.

A smear was made of his lesion, a draining, tender, indurated wound located on the volar aspect of the right forearm, below the elbow. Large Gram-positive "box-car shaped" bacilli were detected on direct smear; on culture these were non-motile in semi-solid media, lysed by *B. anthracis* gamma bacteriophage, and virulent for white mice.

Therapy with procaine penicillin, 300,000 units intramuscularly, B.I.D., was begun. On January 2, 1956, the skin lesion measured 2 cm. in diameter, its center being a black eschar surrounded by a red edematous areola, 12 cm. in radius. Within a week, the inflammatory lesion subsided and dried up. No regional lymphadenopathy was palpated.

The mill in which T. P. worked manufactured hair cloth interlining for suits. The raw materials were goat hair, wool, and synthetic fibers, in varying proportions. The company had reported one case of anthrax in October, 1952, and another in March, 1953. An anthrax sampling program was conducted at the plant on January 31, 1956: surface swabs showed heavy contamination with *B. anthracis*. The Philadelphia Department of Health, in cooperation with the company, took steps to correct this hazard.

J. W., a 25 year old Negro baler at the Puritan Looms Company, noticed an itching spot, "like a mosquito bite", on his right forearm on March 27, 1959. Discomfort continued the next day and the "pimple" enlarged, becoming purple in color. Two days later its firm black center was surrounded by concentric areas of erythema and edema, each 2 cm. in width. Soreness and swelling coexisted in the right axilla.

When seen at Temple University Hospital on March 30, the skin lesion was not tender and there was no fever. Smear and culture showed Gram-positive rods (*B. anthracis*), mixed with Gram-positive cocci (*Staphylococcus aureus*). Eventually a pure culture of *B. anthracis* was obtained, virulent for mice and lysed by gamma bacteriophage. The patient was given 600,000 units of penicillin intramuscularly at the hospital for ten days. He had received three primary inoculations of anthrax vaccine in February and March, 1958, but did not receive a six-month booster inoculation. Several serum specimens were submitted to an agar diffusion test; dates taken and antibody titers recorded: March 31 (1:4), April 2 (1:16), April 4 (1:16), April 7 (1:16).

This man had been employed by Puritan Looms for twenty months, the first year as a sterilizer unit operator, then, after discontinuation of the sterilizing operation, as a hair picker and bale opener for eight months. This Philadelphia factory picks, scours, and blends imported hair and wool prior to further processing at a North Carolina plant. This patient had recent contact with goat hairs from India, Iran, and Pakistan. A survey of the plant by the Philadelphia Anthrax Investigations Unit detected contamination measured by colonies

of *B. anthracis* on each of five blood agar plates streaked from raw materials, dirt and waste. Corrective measures were instituted.

Prophylaxis

The Philadelphia Health Department, in May 1962, offered free anthrax immunizations to some 2000 workers in fifteen wool and hair processing plants in the Delaware Valley. The immunization program, first of its kind in the nation, follows a seven-year evaluation of the vaccine in Philadelphia. Vaccine for this program is provided by the U. S. Public Health Service. Three injections of anthrax vaccine, one-half cc. each into a deltoid muscle, spaced two weeks apart, with a similar booster dose six months later, are considered ninety-four per cent effective in preventing the disease. Further booster injections to sustain immunity are recommended every three years for industrial workers.

The Philadelphia Department of Health, cooperating with the Pennsylvania Department of Health, and the U.S.P.H.S. Anthrax Investigations Unit, Communicable Disease Center, Atlanta, Georgia, have made positive strides in the prevention of industrial anthrax during the past decade.

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Abstract 11

Serum Glycoproteins in Diabetes Mellitus and Atherosclerosis. William S. Frankl, M.D., Robinette Foundation, Hospital of the University of Pennsylvania.

The serum glycoprotein levels were investigated in 100 diabetic patients with and without clinical arterial disease, in 20 non-diabetic atherosclerotic patients, and in 50 healthy controls. The serum protein-bound carbohydrates were separated into albumin, alpha-1, alpha-2, beta, and gamma globulin fractions by paper electrophoresis. The intensity of basic fuchsin staining of the carbohydrates in each fraction in a given electrophoretogram was estimated by an automatic Spinco densitometer-integrator, and the results utilized as a measure of the relative glycoprotein concentration.

Comparing the two groups of patients with the normal controls, the data show: 1) Elevation of total serum glycoproteins in diabetic patients, 2) Highly significant elevations of all globulin-bound carbohydrate fractions in the diabetic group, 3) Moderately significant elevations of only alpha-2 glycoproteins in the non-diabetic arteriosclerotic group, and 4) Moderately significant decrease in the albumin-bound carbohydrates in the non-diabetic arteriosclerotic group. Further analysis of the diabetic patients failed to reveal any difference in serum glycoprotein patterns in those with and those without clinical atherosclerosis or those with and those without severe hyperglycemia ($>$ 150 mgm. %).

Thus, the elevation of the serum beta and gamma glycoproteins may be chiefly related to the diabetic state. The alpha-2 glycoproteins were found to be elevated in both diabetic and atherosclerotic groups, and so the relationship between these glycoproteins and degenerative arterial disease deserves further investigation.

Abstract 12

Experiences with the Fiberscope. Norman N. Cohen, M.D., Department of Medicine,

University of Pennsylvania School of Medicine.

The Fiberscope is a gastroscope using 150,000 glass fibers arranged at one end exactly as at the other end. This series of glass fibers conducts a light image efficiently and therefore does not require a system of lenses. The Fiberscope is so flexible that it can be tied in a knot and still retain its ability to transmit a full image. Because it is flexible, the instrument is safer to use and more comfortable for use in patients. The patient's head need not be held, nor is as much preparative sedation required as with conventional gastroscopy.

Although further improvements will be made, the Fiberscope is, in its present form, an extremely useful instrument for visualization of the stomach and of gastroenterostomies. After using it in over 250 examinations, I feel that there is no portion of the stomach that is blind to it. This does not mean that one can visualize every portion of the stomach in all patients, but rather that there is a reasonably good chance of seeing a particular portion in question. Color photographs and motion pictures can be made with ease through the Fiberscope.

A series of pictures were shown of pathological conditions in various portions of the stomach and at gastroenterostomy sites, along with accompanying x-ray films. The Fiberscope was not considered to be of any use, in its present stage of development, for visualization of the duodenum.

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Changing Concepts in the Therapy of Carcinoma of the Esophagus[1]

By JOHN H. GIBBON, JR., M.D.[2]

THIS evening we are considering cancer of a muscular tube lined with squamous epithelium connecting the pharynx in the neck to the stomach in the abdomen. Fortunately it is not a very frequent site of cancer in the Western World. Here cancer of the lungs, colon, stomach, prostate, breast and uterus all have a greater incidence than cancer of the esophagus. In the Far East, on the other hand, cancer of the esophagus occurs much more frequently than it does in the United States and Europe. The explanation for this is unknown. It is tempting, but foolish, to attribute the difference to diet or to a virus without the proper evidence.

I should like to review briefly a few pathologic and anatomic facts before approaching the subject of therapy. With few exceptions, cancers of the esophagus from the pharynx down to within a few centimeters of the esophagogastric junction are epidermoid carcinomas. In the last few centimeters of the esophagus, adenocarcinomas occur as frequently as epidermoid carcinomas. Many of these adenocarcinomas originate in the gastric mucosa and grow upward into the esophagus. They may also arise from ectopic gastric mucosa and from mucous glands in the submucosa of the esophagus. Azzopardi and Menzies (3), in the *British Journal of Surgery* in March of this year, demonstrated that six adenocarcinomas of the midthoracic esophagus arose in the mucous glands. Two of the tumors were mucoepidermoid carcinomas and four were adenoid cystic carcinomas, or so-called cylindromas. Leiomyosarcomas are relatively rare tumors and from the few that have been reported they appear to have a slightly better prognosis than do the carcinomas (6).

The esophagus, in its upper portion, lies jammed between the membranous portion of the trachea and the bodies of the cervical and upper thoracic vertebrae. It also lies uncomfortably close to the aortic arch and the descending aorta until the lowermost part of the thorax is reached, at which point it turns forward to pass through the diaphragm and connect with the stomach. Esophageal cancer frequently invades these adjacent structures making the problem of surgical excision difficult or impossible. It follows, of course, that all patients with carcinoma of the cervical esophagus or upper thoracic esophagus should be

[1] Alvarenga Prize Lecture XXII, College of Physicians of Philadelphia, 3 October 1962.

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bronchoscoped to rule out invasion of the trachea or left main bronchus. Unfortunately invasion of the wall of the aorta cannot be determined before operation. Also because of the proximity of the trachea and the aorta, two fatal complications may arise late in the course of the disease. Fistulae are apt to occur between the trachea and the esophagus and the growth is also likely to erode into the aorta causing death from hemorrhage. In our experience, radiation therapy does not prevent these two fatal complications.

Like other epidermoid carcinomas, cancer of the esophagus does not metastasize early by the blood stream, which is the one hopeful feature in both the surgical, and the radiation therapy of this cancer. The tumor tends to grow not only circumferentially, but also longitudinally. Not infrequently in the submucosa, islands of tumor cells occur at some distance from the original growth. Furthermore, extension in the submucosa may be found microscopically up to 12 cm. beyond the palpable and macroscopic limits of the growth (15). Because of this fact, far wider resections are currently being performed and there is a growing tendency to remove the entire esophagus to obviate local recurrences.

Lymphatic drainage, of course, is up and down the esophagus. In the neck, the drainage is also into the cervical lymph nodes and radical neck dissections are often indicated in dealing with cancer of the cervical esophagus. In the chest, the lymph nodes along the upper esophagus communicate with the paratracheal group of lymph nodes, and these should be removed when removing the esophagus. Further down, the lymph nodes on the esophagus communicate with those in the pulmonary ligament and all these nodes should be removed when resecting the esophagus. The chain of lymphatics and lymph nodes at the lower end of the esophagus communicate with lymph nodes along the left gastric artery and its branches, which in turn communicate with those about the celiac axis and along the aorta. A radical resection of the lower esophagus, therefore, requires the removal of the upper portion of the lesser curvature of the stomach with the branches of the left gastric artery and the accompanying lymph nodes in the hepatogastric ligament.

I shall discuss first surgical therapy and then radiation therapy, emphasizing attempts at cure rather than palliation. Most attempts at palliation neither prolong the patient's life nor add to his comfort. In my opinion, there is *no* chemotherapeutic treatment of esophageal cancer. Finally, I shall discuss combinations of radiation and surgical therapy which are winning rather widespread approval at the present time.

Surgical Therapy

Cancer of the esophagus presents the surgeon with the difficult problem not only of excising the deeply seated primary lesions in continuity with the lymph vessels and lymph nodes draining the region, but also with the problem of restoring the continuity of the gastrointestinal tract. Indeed, the early successful operations upon the thoracic portion of the esophagus ignored the second part of the problem by suturing the proximal cut end of the cervical esophagus to the skin of the neck to allow the saliva to drain out on the skin and then gastrostomy was performed to feed the patient. Only within the last 30 years have surgical operations been devised and successfully performed for the immediate restoration of oral gastric continuity following resection of the thoracic esophagus.

As might be expected because of its greater accessibility, cancer of the cervical esophagus was sucessfully operated upon many years before cancer of the thoracic esophagus. Czerny (8) reported the first successful resection of the cervical esophagus for cancer in 1877. The upper stump was brought out on the neck as a mucous fistula and the lower end was sutured to the skin for feeding purposes. The patient died of the disease 15 months after operation. Von Hacker (29), in 1908, was able to collect 25 reported cases of local resections of the cervical esophagus for carcinoma. Five years later, in 1913, Torek (28) reported the first suc-

cessful resection of the thoracic esophagus. He opened the left pleural cavity through the 7th interspace, dividing the 4th, 5th, 6th and 7th ribs posteriorly. After resecting the thoracic esophagus, the proximal stump was brought out in the neck as a mucous fistula and a gastrostomy was performed.

For the next 20 years, there were isolated reports of successful resections of the thoracic esophagus for cancer. All the patients were left with a gastrostomy and with a mucous fistula in the neck. Most patients died before plastic procedures to connect these two openings could be completed.

These early attempts to restore oral gastric continuity were all extrathoracic. Ochsner and Owens (18), in 1934, gave an excellent review of these methods. In most of them, a segment of bowel, a portion of the stomach, a skin tube, or a combination of these were placed in a subcutaneous position on the anterior thoracic wall. With a few exceptions (32), these operations have been abandoned because of the poor cosmetic results, leakage, stricture, and the difficulty of maintaining an adequate blood supply to the segment of bowel or stomach transplanted to the subcutaneous position.

In 1933, Ohsawa (19) and Seo (26), of Japan reported eight survivors after 20 resections of the thoracic esophagus for cancer with esophagogastrostomies. Five years later, Adams and Phemister (1) were the first to report a successful resection of the lower esophagus with primary esophagogastric anastomosis in the Western World, although Marshall (14) had done such an operation successfully in the preceding year. There followed reports by Garlock (9) in 1940, and by Churchill and Sweet (7) in 1942, that this operation could be performed with a low mortality. The scope of the operation was gradually extended to lesions more proximal in the esophagus, until finally lesions at the level of the aortic arch were being excised with esophagogastrostomies performed high in the thorax above the arch of the aorta. This development took place in the decade 1940–50.

A left thoracotomy, opening the diaphragm to mobilize the stomach, has remained the standard incision for lesions of the lower esophagus and cardia of the stomach. The high operative mortality of esophagogastrostomy above the level of the inferior pulmonary vein and especially above the aortic arch, led to trials of other operative approaches. A right thoracotomy was advocated for cancers of the mid and upper portions of the thoracic esophagus combined with a separate mid-line laparotomy. As a posterolateral thoracotomy with the patient lying on his side is necessary for an adequate exposure of the entire thoracic esophagus, this necessitates turning the patient on his left side before or after mobilizing the stomach through the abdominal mid-line wound in the supine position. If the operation is begun with the posterolateral thoracotomy, the patient must be turned twice; first to the supine position to mobilize the stomach and then back again to the lateral position to perform the esophagogastrostomy. If the stomach is mobilized first and at thoracotomy the lesion proves to be inoperable, an unnecessary laparotomy will have been performed. If the thoracic portion of the operation is performed through an anterolateral thoracotomy, both thoracic and abdominal operations can be performed without turning the patient, but mobilization of the lower half of the thoracic esophagus must be accomplished as a practically blind procedure.

The next development was to replace the high anastomosis in the thorax with a cervical esophagogastrostomy. Again these operations were accompanied by a forbidding mortality, up to 50 per cent. Furthermore, after operation these patients often have to sleep propped up at night to avoid regurgitation of gastric juice into the pharynx and larynx. Despite the performance of a pyloromyotomy, executed because of the bilateral vagotomy, there is often troublesome gastric distention in the immediate postoperative period.

Because of the high operative mortality and the difficult postoperative course with cervical or high thoracic esophagogastrostomies, other organs have been used to restore oral gastric continuity. Rienhoff (22), in 1946, was the

first to use the jejunum to bypass a portion of the esophagus. A segment of colon has been used for the same purpose in both the right and left pleural cavities by Robertson et al. (23), 1952, Battersby (4), 1953, and Kergin (12), 1953. Harrison (11), in 1949, used the jejunum to bypass the entire thoracic esophagus in the left hemithorax and Robertson and Sarjeant (24), in 1950, bypassed the entire thoracic esophagus by a segment of jejunum in a substernal position. However, the marked curvature of the vascular arcades in the upper portion of the jejunum makes it difficult to insure an adequate blood supply to a jejunal segment of this length.

The shortest path between the cervical esophagus and the stomach would not be the path taken by the normal esophagus, nor would it be the path taken by an organ lying anterior or posterior to either lung. The line would probably run from the thoracic inlet through the superior portion of the heart to the anterior surface of the distal half of the stomach. The next shortest route is the substernal one. The Frenchmen, Lortat-Jacob (13), in 1951, and Rudler and Monod-Broca (25), also in 1951, reported cases in which the right colon was placed in the retrosternal position and anastomosed to the esophagus in the neck and to the jejunum in the abdomen. It is, of course, preferable to anastomose the abdominal end of the colonic segment to the stomach, rather than to the jejunum, so that the normal processes of digestion are not disturbed. The first complete successful bypass of the intrathoracic esophagus using the right colon in the retrosternal position, anastomosed to the cervical esophagus above and to the stomach below was reported by Sherman et al. (27), in 1955. In the succeeding seven years, there have been many reports of the successful performance of this operation. There have been a few advocates of the use of the left colon for this purpose, but in my opinion, the right half of the colon has the better blood supply, particularly in old people where the marginal artery in the region of the splenic flexure may be quite narrow.

Now let us consider for a moment the surgical therapy of cancer high in the cervical esophagus. In 1942, Wookey of Toronto (31) described an operation for carcinoma of the lower part of the pharynx and the upper part of the esophagus. It is a two-stage operation. At the first stage, a rectangular, transversely-placed, full-thickness skin flap is raised. The larynx, pharynx and upper cervical esophagus, less commonly the cervical esophagus only, are then excised. A permanent tracheostomy is established. The skin flap is then used to make a deep groove in the neck connecting the pharynx above with the esophagus below. At the second stage, six to twelve weeks later, this groove is converted into a skin tube and the skin is closed over it. The first patient was operated upon by Wookey in 1934. She lived for two years and then died of cervical metastasis. Mustard (17), in 1960, reported 44 patients operated upon by this method up to the end of 1959 at the Toronto General Hospital. Thirty were done by Wookey and 14 by Mustard. It was the primary treatment in 38 patients and in the other six it was performed when radiation therapy had failed. In about a third of the cases, only the cervical esophagus was excised. The other two thirds required removal of the larynx and the pharyngoesophagus. There were nine five-year survivals, or 24 per cent of those operated upon more than five years ago. Four patients were living without evidence of recurrence ten years or longer after the operation. Similar results with the Wookey operation have been obtained by Owen (20), 1950, and by Raven (21), 1958. Owen had six of 36 patients living five years or longer (17 per cent), and Raven had eight of 37 patients living five years or longer. These results for the treatment of the very high cancers of the cervical esophagus are far better than any reported for other portions of the esophagus.

Radiation Therapy

The results of radiation therapy, like the results of surgical therapy, are poor. By "results," I mean percentage of five-year survivals after treatment without evidence of local recurrence or metastasis. In some series, the results

of radiation are roughly equal to those obtained by operation, and in other series, the results of radiation are not as good. Buschke (5), in 1954, reported that the results of surgery and irradiation for similar groups of patients were about the same. The "similar groups" is, of course, the crux of the problem. The radiotherapist undoubtedly treats more far advanced patients than the surgeon, while the surgeon has to contend with an operative mortality which adversely affects his five-year survivals.

Morrison (16), in 1959, reported a small group of 74 patients treated at the Hartford Hospital in which he compared surgical and radiation therapy. Two of 19 patients who had a resection of the esophagus lived more than five years without evidence of recurrence. Cobalt 60 therapy was begun in 1954 at Hartford Hospital. Twenty-two patients with epidermoid carcinoma of the esophagus have been treated since then with cobalt. None of these patients lived five years and the longest survival time was 28 months. Average survival time was nine months. Significant complications were two aortico-esophageal fistulae, one tracheo-esophageal fistula, and one reactivation of tuberculosis of the lung. Morrison concluded, as did Buschke, that the proper therapy for the lower fourth of the esophagus is surgical and for everything above that, radiation therapy.

Adams and Salzman (2), of the Lahey Clinic, reported that of 40 patients who received 2,000,000-volt radiation therapy for cancer of the esophagus, only one was alive two and a half years after treatment, and this patient had metastasis in one lung. Walker, et al. (30), of the Mason Clinic, reported in 1959 that out of 18 patients treated with cobalt 60, three were alive without disease at 25, 24, and 18 months. In the preceding 30-year period, no patient treated with conventional x-ray therapy survived one year. Mustard (17), reporting from Toronto, stated that up until 1953, 55 patients with carcinoma of the hypopharynx and cervical esophagus were treated by conventional radiation therapy. One of these patients lived five years after receiving approximately 6000 roentgens. He died five years and seven months after treatment from other causes without evidence of recurrence of the carcinoma. Since June 1953, cobalt 60 therapy has been employed for the same type of patients. Seventeen have been treated. Only three are still living, one four years and two three years after treatment. One of the 17 patients had a prompt recurrence, was treated surgically, and is well five years and ten months later without evidence of recurrence.

Thus the great hope that was held for the treatment of carcinoma of the esophagus by cobalt 60 therapy has not, as yet, materialized. Therefore many of us, both surgeons and radiotherapists, have come to the conclusion that a joining of forces is necessary in the treatment of cancer of the esophagus in the low cervical and high thoracic regions. The primary treatment of cancer of the low thoracic esophagus and the gastric cardia remains surgical. The plan most generally adopted to date is the use of a substernal segment of colon to connect the cervical esophagus with the stomach as the first stage of a two-stage operation. The second stage is resection of the thoracic esophagus. To this two-stage operative procedure is added cobalt 60 radiation therapy. The radiation therapy may be given before the first stage, between the stages, or after both stages have been completed. We prefer the second course for the following reasons: (1) the patient is promptly able to eat and (2) placing the radiation therapy between the two stages may render a previously inoperable cancer operable.

I and my associates have thus treated three patients without an operative death. One of the three patients died after completion of the radiation therapy but before the second-stage operation could be performed. At autopsy, no cancer tissue could be found in the esophagus or elsewhere. Gregorie and associates, 1962 (10), use a somewhat different plan of treatment. They give a dose of 4500 r preoperatively. Six weeks later, the esophagus is resected and replaced by a colonic segment. They believe that when a dose of 6000 r is given, the esophagus and the spinal cord are likely to be injured.

Thus, possibly a combination of cobalt 60

and surgical therapy may improve the results of treatment of this very lethal disease. I have the strong conviction, however, that the proper therapy of all kinds of cancer has yet to be discovered, and that it will probably be found in a study of the factors within the body that are concerned with the inhibition or the stimulation of cellular growth.

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Current Status of Eradication of Infectious Diseases[1]

By E. HAROLD HINMAN, M.D.[2]

Arthur Parker Hitchens

As a recently arrived resident of the Commonwealth of Pennsylvania and of the cradle of American Medicine, Philadelphia, it is a signal honor to be invited to give the Seventh Arthur Parker Hitchens Lecture under the sponsorship of the Section on Public Health, College of Physicians of Philadelphia, and Region I of the Pennsylvania Public Health Association. The distinguished accomplishments of my predecessors in this lectureship make me humble, as does the illustrious career of Dr. Arthur Parker Hitchens, whose memory it recalls.

It was never my good fortune to be intimately associated with Colonel Hitchens, but his professional contributions in Microbiology and Public Health are well recorded. It was my privilege, however, to be closely associated with many of his military colleagues, especially Colonel Charles F. Craig, Colonel Joseph F. Siler, and others.

The recent book by Paul F. Clark, "Pioneer Microbiologists of America", devotes considerable attention to Hitchens in his chapter on Pennsylvania, New Jersey and Delaware. From 1900 Hitchens gradually took over supervision of the Mulford Antitoxin Laboratories, becoming its director in 1906. From 1913 to 1923 he was secretary of the Society of American Bacteriologists and, according to Clark, it was his prodding that lead to the establishment of the *Journal of Bacteriology* in 1916. A few years later the Society began, under Hitchens' editorship, the *Abstracts of Bacteriology*, which, in 1925, merged with *Biological Abstracts*. After Bergey's death, Hitchens became a member of the editorial board for revision of "A Manual of Determinative Bacteriology", further evidence of his editorial capacities.

Arthur Parker Hitchens had a varied professional career which included in addition to the direction of the Mulford Laboratories, the U. S. Public Health Service, the Army Medical School, adviser in public health to the Governor General of the Philippine Islands (1924–1929), and Professor of Public Health and Preventive Medicine in the University of Pennsylvania (1939–1942). He returned to active military duty during World War II and was retired in 1945. Subsequently he served as Commissioner of Health of Wilmington, Delaware (1945–1948), and finally as Director of Laboratories of the Pennsylvania State Board of Health.

In the organization of the School of Public Health at the University of Pennsylvania in the late 1930's, Hitchens displayed his fine organizing talent and capacity to find and attract able colleagues. One of his associates has epitomized his personal qualities: "he was an individual you would love to have in your family". He was a beloved teacher.

Other demonstrations of his abilities as a scientist include the Monograph on Dengue, published by Siler, Hall and Hitchens from the Academy of Science, Manila, 1926. This work unequivocally demonstrated that *Aedes aegypti* was a vector of dengue and that all efforts to utilize *Culex quinquefasciatus* as a vector met with failure.

Clark (1961) has summarized the career and place of Hitchens as a man of science as follows: "Hitchens was an attractive, genial, versatile, far-seeing person, full of enthusiasm for his dreams; through his persuasive vigor, these dreams frequently became realities. We need more such prodders, especially those with so many admirable qualities." It is with pleasure

[1] Arthur Parker Hitchens Lecture VII, College of Physicians of Philadelphia, 24 October 1962.

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that I present this lecture on "Current Status of Eradication of Infectious Diseases" in memory of Colonel Arthur Parker Hitchens. It is an added honor to have Mrs. Hitchens present with us on this occasion.

The Concept of Eradication

While the eradication of a few human infectious diseases has been under consideration for several decades, it is only within the past 15 or 20 years that serious, widespread effort has been directed to this laudable objective. In using the term 'eradication' the writer means the extinction of the pathogenic organism on a worldwide basis. Once this situation were achieved, no longer would the costly continuing programs of disease control be necessary. Since the era of Pasteur, this has been a potential objective through attack upon the microorganism, through the immunization of the human host, or through the eradication of the essential arthropod vector in diseases spread *only* by this means. Before considering any true eradication programs of human disease it may be of interest to review the experience in the field of attack on certain diseases of livestock, even though it is recognized that the test and slaughter campaign, so successfully undertaken in certain livestock diseases, is not at all applicable in campaigns against human infections.

Eradication of Diseases of Livestock

The Subcommittee on Reorganization and International Organizations (Senator Humphrey, Chairman of the Committee on Government Operations of the U. S. Senate, 1961), has prepared a report entitled, "Veterinary Medical Science and Human Health". This report includes certain historical notes on the eradication of various diseases of livestock.

Contagious bovine pleuropneumonia was introduced to the port of Brooklyn, New York, in 1843. It spread to nearby eastern seaboard States, then moved westward with the early settlers and the growing livestock industry. Foreign embargoes threatened this developing industry and the Bureau of Animal Industry of the Department of Agriculture and the various states joined together and in 1892 achieved eradication of the disease. It has never been reintroduced into the United States.

Foot-and-mouth disease is considered to be the most dangerous plague of livestock. It entered the United States in 1870 and has gained entry 8 times since then, the most recent invasion being in 1929. Through strenuous inspection and the waging of a full-scale war whenever it appeared it has now been excluded for more than 30 years. The United States has cooperated with Mexico and Canada to eradicate foot-and-mouth disease from the North American Continent for the past 14 years. About one million animals have been slaughtered to eradicate the infection.

Vesicular exanthema is a virulent disease of swine which is difficult to distinguish from foot-and-mouth disease. By state and local action it was confined within one state for 30 years and then suddenly, within a few months, appeared in 42 states and the District of Columbia. A vigorous campaign during the past decade, including the passage of laws requiring the cooking of garbage fed to swine, led to its eradication, announced in November 1959.

Vigorous campaigns are still underway, designed to eradicate bovine tuberculosis and brucellosis. These are based upon testing of livestock and slaughter of positive animals. Compensation to the owner has been necessary. While national eradication has not yet been attained, bovine tuberculosis is at an extremely low level and this has had an enormous impact upon the incidence of the bovine form of tuberculosis in man. With the discovery in 1893 that Tick Fever (Piroplasmosis) of Cattle was transmitted by the cattle tick, methods were developed for dipping the cattle in this country, except for a small buffer area along the Mexican border. In the early 1900's the Bureau of Animal Industry undertook, jointly with the States, the eradication of glanders in horses and mules and succeeded in this goal in 1929.

Two poultry diseases, fowl plague and Asiatic Newcastle disease, have been eradicated, the

former achieved in 1925, and the latter in 1950. Another strain of Newcastle disease is still widespread but the Asiatic form is more virulent.

More recently, success has been achieved in wide areas of the Southeast in eliminating the screwworm, a serious pest of livestock. The fly lays its eggs in the open wounds of animals and the larvae burrow into the flesh. Utilizing radiation to sterilize the laboratory-produced flies which are released in large numbers and mix and mate with the native wild flies, producing sterile offspring, brought successive reductions in the native fly population and its disappearance.

In the case of a number of animal diseases it has been found feasible by slaughter of infected and exposed animals to eradicate the infection. This philosophy is based upon the fact that when it is possible to wipe out a disease, it is more economical to do so than to continue to live with it and suffer continuing losses. Eradication of the screwworm in the Southeast cost under $10 million in State and Federal funds. Prior to the campaign, this pest was causing livestock producers of that area an estimated annual loss of $20 million.

This review of achievements of eradication or near eradication of certain diseases of domestic animals on a hemisphere basis is of considerable interest but does not prove the feasibility of similar campaigns for human disease. However, it does highlight the economic aspects of eradication versus control and in every instance the principle of extinction of the infection is shown to be cheaper than annual or continuing control programs. The extensive reliance on slaughter of infected animals increases the speed with which eradication can be achieved. I believe, however, that alternative methods could have been evolved in most instances, but were not available or would have taken a much longer time to apply over huge areas.

Malaria Eradication

Malaria is still the major infectious disease, both from the point of view of morbidity and mortality, in the underdeveloped countries of the world. The Director General of WHO has stated, "the consequences of malaria cannot be reckoned only in terms of the human death and suffering that lie behind these figures. The importance of the disease from an economic and social point of view derives from the many insidious effects. Malaria is the world's greatest single cause of disablement; it stunts physical and mental development, it hampers the exploitation of natural resources, reduces agricultural production, and impairs industry and commerce". WHO reported 250 million cases of malaria in 1955 and 140 million this year (1962).

The ancient Chinese were well acquainted with malaria. Legends state that three demons were responsible for the headache, chills, and fevers. The first demon was equipped with a hammer, the second with a pail of cold water, and the third with a stove.

The epidemiology of malaria involves three essential links: (1) the malaria parasite, which normally lives within the human red blood cells and multiplies within a 24, 48, or 72 hour period, depending upon the species; (2) the essential anopheline vector which must ingest the infective stages (gametocytes), which develop within the insect during a period of 10 to 15 or more days and undergo considerable multiplication in the process; and (3) the human host which becomes infected by the bite of the female anopheline carrying the sporozoites to the susceptible individuals.

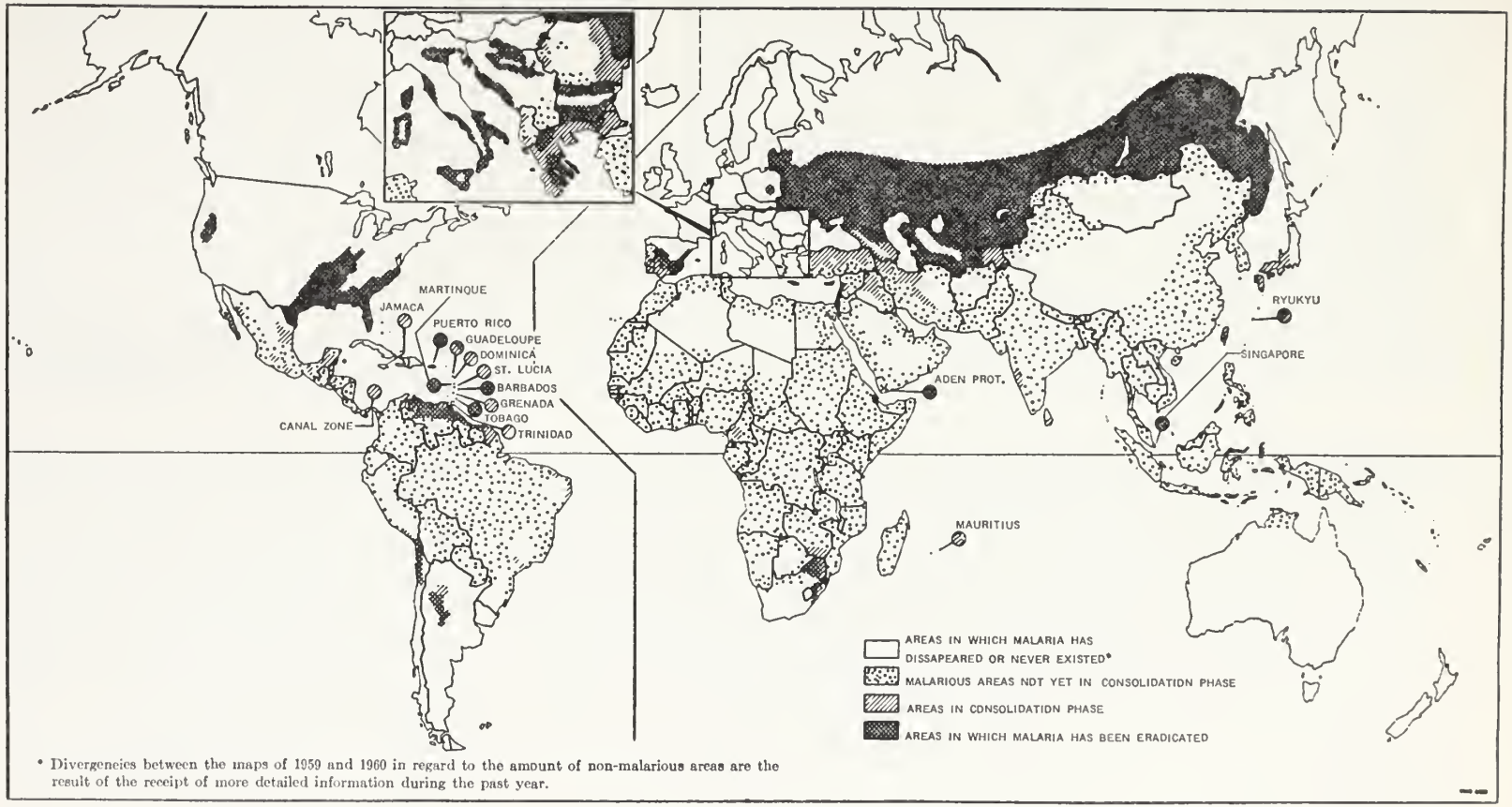
These basic links in the epidemiological chain have been reasonably well understood since the beginning of the twentieth century and have led to the development of a variety of control procedures, e.g., chemotherapy, chemoprophylaxis, space sprays to kill the adult anopheline, larvicides, screening of houses, elimination of breeding places of the larvae, etc. However, it was not until the evolution of synthetic chlorinated hydrocarbons that a really practical attack against malaria over wide areas, with great variety of anopheline breeding conditions, and in-

FIG. 1

volving many species of vectors, became economically feasible.

DDT (dichlorodiphenyltrichlorethane) possesses a remarkable ability to kill mosquitoes with only a short contact and when sprayed on surfaces such as walls. This killing power of the residual film is usually effective for many months—in fact if the surface were undisturbed, the residual effect would probably have a duration of about one year. Thus, the inside of dwellings (ceilings and walls, under surfaces of large furniture, etc.) can be sprayed with the insecticide and all of the treated surfaces on which the anopheline mosquito rests

EPIDEMIOLOGICAL ASSESSMENT OF PRESENT STATUS OF MALARIA, DECEMBER 1960



* Divergencies between the maps of 1959 and 1960 in regard to the amount of non-malarious areas are the result of the receipt of more detailed information during the past year.

Redrawn from WHO

FIG. 2

before or after feeding will provide a lethal resting place since small particles of this poison will adhere to the insect's feet, subsequently be absorbed, and within a few minutes will kill the mosquito. Spraying every 6-12 months is recommended in those areas where year-round anopheline breeding occurs. Weathering, whitewashing, painting, papering, ordinary cleaning, rubbing against the treated surface by man and his household animals and other activities, in addition to normal renovation and new construction, all tend to curtail the percentage of treated surface as time passes after the spraying. The cost of two sprayings per year is fantastically low in certain areas of Asia where labor costs are low and the populations are concentrated, e.g., about 7½¢ per capita per year as contrasted to about ten times that figure in Latin America.

The basic assumption of eradication of malaria is that if the anopheline mosquitoes bite man within his dwellings, rest within the home either before or after a blood meal on the treated surfaces, then no new transmission will occur. Once transmission ceases, human malaria will *rapidly disappear*. Most relapses, even in untreated cases, occur within the first year of the primary infection, with decreasing numbers in the second year. Thus, intensive house residual spraying for a four year period provides a substantial factor of safety.

No country should be encouraged to undertake a malaria eradication program without a very definite understanding of the magnitude of its malaria problem, the definition of its geographical extent, the approximate cost of total eradication of the disease within its limits, and a commitment on the part of its highest governmental authorities that it will prosecute the campaign until the end. Generally a special decree or law is necessary to set up a malaria eradication service as an adjunct to the Ministry of Health. This legislation must emphasize the nature and urgency of the problem, provide for adequate financing, establish the right of entry to premises for all purposes of the campaign, including spraying, taking of blood films, compulsory notification of cases, measures for prevention of reintroduction of malaria, notification of construction of new habitable premises, etc. An unusual degree of autonomy will be essential for this program, including exemption from certain cumbersome personnel practices, appropriate pay scale, authority to station employees in any part of the country where they are needed, flexibility in hiring and firing employees, and since the campaign is normally of limited duration the usual civil service rights of seniority and retirement may have to be modified. Efficiency in purchasing, payment, accounting, etc., must be assured. The conduct of an eradication program has many similarities to a military campaign. There can be no division of authority; in each activity, one individual along the line must be held accountable for results and certainty of demotion or discharge for cause must be inevitable. There must be centralized *direction* of the campaign, but decentralized *execution* of it.

A malaria eradication program is composed of four phases: (1) preparatory phase; (2) attack phase; (3) consolidation or surveillance; and (4) maintenance.

The *preparatory* phase includes an initial survey to delimit the malarious areas of the country and to determine the order in which the various malarious zones will be attacked; data on seasonal anopheline prevalence, their susceptibility to various insecticides, vector feeding, resting habits and longevity. Recruitment and training of staff and pilot operation are all part of the preparatory phase which will normally require at least one year.

The *attack* phase is designed to provide residual spraying, once or twice annually, to all residences for four consecutive years. Every habitation must be thoroughly sprayed. The enormity of this undertaking can be appreciated by the fact that the spraying operations in India until recently required 100,000 men. The problems of providing a good organization with proper transport and supplies and the obtaining of cooperation of the inhabitants in removing their effects

during the spraying operations are tremendous. In one zone in Mexico, one-half of the spraying brigades are "mounted"—donkey, mule or horse.

The determination as to when to withdraw spraying is difficult. The WHO Expert Committee on Malaria (1959) stated that, "There are two criteria for determining the point at which spraying should be discontinued: (a) interruption of transmission; and (b) reduction of the numbers of cases to zero or at least to a level so low that endemicity cannot readily be re-established. The reservoir of infection may be said to be practically depleted when no cases can be found in a reasonably intensive search".

The third phase is called *consolidation* or *surveillance*. Actually an active survey program attempting to find persons with malaria parasites or a system of examining the blood of fever cases should be in effect throughout the entire attack phase. As the latter phase ends, the small remaining pockets of transmission and the last small reservoirs of parasites in man must be located and eliminated. As positive slides are encountered, the cases are treated, but it is the hazard of transmission which concerns us most, and so included in this surveillance must be adequate provision for localized spraying if there is evidence of new transmission.

The classical methods of measuring malaria in a community have included such malariometric surveys as infant parasite examinations, school surveys or general population spleen or parasite surveys. The establishment of such malaria rates have been sufficiently accurate when malaria was highly endemic but gave a static measure of the malaria existing at the time of the survey. As malaria is reduced, for example, to a rate of about one per cent or less of the population under study, these techniques become almost valueless and increasingly expensive as the size of the sample must be increased. These conventional surveys may be entirely satisfactory during the preparatory and early attack phase of a malaria eradication program. They must then be replaced by a more effective method of "malaria case detection".

Surveillance is the distinguishing feature of a true malaria eradication program and is undertaken as the attack phase progresses, when the incidence of the disease has fallen to such a low point that routine blood and spleen surveys are no longer productive. Surveillance is either active or passive. In an active surveillance campaign there is an active house to house search for people who have or have had a recent history of fever, made by paid investigators of the malaria service. Blood films are taken from them and may be obtained by regular house to house visitation (fortnightly in India—50,000 employed surveillance workers and supervisors). Passive surveillance is the utilization of voluntary notification as in Mexico. Each community has a collaborator, who most frequently is a school teacher or may be a municipal official, priest or civic leader. In any case an effort is made to obtain a blood film and if fever has been reasonably suspected, a suppressive dose of antimalarial (chloroquine) is administered. When a positive report comes from the laboratory, the zone headquarters *immediately* makes an epidemiological investigation, provides complete treatment (primaquine) to the patient, and if local transmission is suspected, local spraying is instituted. The passive form of surveillance relies on notification of all suspected malaria cases and the submission of blood films from fever cases by doctors or laboratories taking the films, together with subsequent verification of the disease. Various combinations of active and passive surveillance are in effect in different countries of the world.

The fourth and final stage of eradication is *maintenance*. It is generally believed that this represents the time for incorporation into the regular health department's activities of responsibility for carrying on more or less indefinitely a modest surveillance program. The phase of maintenance will last as long as malaria exists in the world, but it does not require a special staff.

The criteria of malaria eradication has been

adopted by WHO. Their Sixth Expert Committee has stated that, "The recognition of absolute freedom from transmission or of absolute absence of remaining infections, presents insuperable obstacles. The practical elimination of the vast majority of infections occurs several years before the last one disappears, but experience shows that these last few cases need not re-establish endemicity. Malaria may be imported into any country, and though an imported case might cause a few secondaries, it would not be proper to call the country malarious unless the disease became established in it. "Malaria eradication may therefore be assumed when an adequate surveillance system has not discovered any evidence of transmission or residual endemicity despite careful search for three consecutive years, in the last two of which, at least, no specific general measures of anopheline control have been practiced".

Within the United States, through the Malaria Control in War Areas and the Extended Malaria Control Program, great progress was achieved in reduction of malaria, but it was not until 1947 that funds were unequivocally appropriated for malaria eradication. This campaign proceeded expeditiously and whereas in 1935 there had been a total of 150,000 cases of malaria reported in the United States, and in 1945 a total of 60,000, the number by 1955 dropped to 552.

It is interesting to note that Dr. Frederick L. Hoffman, statistician for the Prudential Insurance Company, read a paper in 1915 entitled, "A Plea for a National Committee on the Eradication of Malaria", that led to the organization of the National Malaria Committee which subsequently became the National Malaria Society in 1941. The National Malaria Society at its symposium adopted Criteria of Malaria Eradication (Hinman, 1951).

Malaria eradication was started in Venezuela in 1947, and substantial progress made by 1950. Quickly Chile, British Guiana and Martinique achieved eradication in this hemisphere. Italy was the first country to achieve eradication in Europe, depending on DDT residual spraying.

As a result of the achievement of eradication of malaria from various parts of the world the XIV Pan American Sanitary Conference at Santiago, Chile, in October 1954, adopted a resolution to eradicate malaria from the hemisphere, and in May 1955, the Eighth World Health Assembly adopted the ultimate goal as eradication of the disease. WHO requested its member governments to intensify plans for nation-wide malaria control and convert these to malaria eradication. It urged governments to give priority to malaria eradication projects in their requests for assistance under the United Nations Expanded Programme of Technical Assistance, and to provide the locally available resources which are required to achieve malaria eradication. It has taken the initiative, provided technical advice, and encouraged research and coordination of resources in the implementation of a global eradication program. It has used certain of its own resources as well as its Malaria Eradication Special Account (MESA) to financially support the program. PAHO has established its own MESA. The United Nations Children's Fund (UNICEF) has been contributing $7–10 million annually in support of malaria eradication activities.

Present status of malaria eradication

The International Cooperation Administration (now AID) Expert Panel (Soper, 1961) estimated that the cost of completing malaria eradication among the entire one and a quarter billion people, subject or recently subject to the disease, beginning with calendar year 1960 to the end of the program, would be $1,342,500,000. It is encouraging to note that since their estimate was made India discontinued spraying operations in areas in which 150,000,000 population live. It would be impossible to estimate the date for completion of the program. In Africa only very limited eradication programs have been undertaken and it would be quite logical to consider them in the pre-eradication phase. I would be bold enough to forecast the achieve-

ment of eradication from the Western Hemisphere (with the possible exception of the Upper Amazon basin), and from Asia (outside the Iron Curtain with the exception of Borneo and certain outlying parts of Indonesia) within a decade. Europe has achieved eradication.

A "crash" program of the nature of malaria eradication inevitably would encounter both organizational and administrative difficulties. Dr. John Logan has stated "that malaria eradication involves the large scale application of a few relatively simple procedures which are based on modern research and investigation. Its success, however, lies essentially in the effectiveness and thoroughness with which these procedures are carried out. Eradication demands precision; it cannot be achieved by slipshod methods, inadequate coverage, or poorly trained and inefficient personnel. Its scientific basis is as exacting as the principles governing the design and construction of a modern hydroelectric plant".

Migrant populations in many of the malarious areas of the world create a special problem since no fixed abode is available for residual spraying. Mass drug therapy or medicated salt may be applicable in certain situations. The scarcity of trained personnel, particularly with training in administrative skills, makes the operation of a program of malaria eradication extremely difficult in certain countries.

It must be assumed that malaria will be reintroduced into some areas after it has been eradicated. If adequate surveillance is being carried on, it should be detected before much secondary transmission occurs. Our experience in the United States with reintroduction of malaria is of interest. Associated with the "Korean incident", 25–28,000 troops returning to the United States had either primary attacks or relapses of malaria. Only 85 secondary cases were ever demonstrated to result from these returning service men, and an epidemic of 35 of these occurred in a group of Camp Fire Girls at Lake Vera, Nevada County, California (Brunetti, Fritz and Hollister, 1954).

The PAHO confidently forecasts eradication of malaria in almost all countries and territories in the Americas by 1968. In the five year period 1956–1960, a total of $141,000,000 was spent on the eradication of malaria, of which $106,000,000 was contributed by national governments and $35,000,000 by PAHO/WHO, UNICEF and ICA. The additional estimated (PAHO) amount needed to eradicate malaria in the Americas by 1967–68 is $165,000,000, of which national governments will probably be able to provide $115,000,000 to $120,000,000, with the remainder coming from other sources.

The United States has contributed approximately $211 million to the worldwide eradication program through bilateral and multilateral channels and a U. S. controlled counterpart since the initiation of the program in 1957 (see accompanying table). Of this, $123 million have been through bilateral contributions (AID and its predecessor agencies) in the following countries: Cambodia, Republic of China, Indonesia, Philippines, Thailand, South Vietnam, Ceylon, India, Iran, Jordan, Nepal, Ethiopia, Liberia, Libya, Brazil, Colombia, Bolivia, Ecuador, Guatemala, Haiti, Honduras, Jamaica, Nicaragua and Paraguay. Approximately $28 million has been given to WHO, PAHO and UNICEF. This has constituted over 90 per cent of all funds used by the WHO and PAHO and 33 per cent of the UNICEF budget spent for malaria eradication activities.

Smallpox Eradication

In 1958 the Eleventh World Health Assembly requested the Director General to carry out an investigation of the means of ensuring worldwide eradication of smallpox. In 1959–1960 and again in 1961 the Twelfth, Thirteenth and Fourteenth World Health Assemblies asked for collection, from the countries concerned, of information on the organization and progress of their respective eradication program. The following information on the status of eradication was presented by the Director General to the Fifteenth World Assembly in Geneva, May 1962. The

EXPENSES OF WORLD-WIDE MALARIA ERADICATION, FISCAL YEARS 1958–1962
(in millions of dollars)

	1958	1959	1960	1961	1962	Total '58–'62
Host Governments	54.6	50.8	54.6	63.3	72.0	295.3
International Organizations and Others (WHO, PAHO, UNICEF)*	9.1	8.5	14.6	16.9	15.7	64.8
United States Contributions†	34.7	33.8	43.5	46.6	53.2	211.8
Total	98.4	93.1	112.7	126.8	140.9	571.9
United States Percentage of Total	35%	36%	39%	37%	38%	37%
United States Percentage of International Aid	79%	80%	75%	73%	77%	77%

* Includes United States Contributions which are contained in "U. S. Contributions" below.

† Includes bilateral assistance, U. S. Contributions to International Organizations as well as U. S. Controlled Counterpart (local currencies).

criteria accepted by WHO for eradication is as follows:

> From a practical viewpoint, countries in which smallpox has recently been persistently present may consider the disease to be eradicated when no cases of smallpox occur during the three years following the end of a satisfactory vaccination programme. Although special conditions in individual countries may result in changes in the manner of conducting vaccination programmes, smallpox is generally held to disappear if the successful vaccination of at least 80 per cent of each population group in a country is achieved within five years from the commencement of the campaign.
>
> Countries which have eradicated smallpox should adopt measures to maintain such eradication, either by means of establishing in their Health Services a permanent immunization programme, or by the combined application of isolation and immunization measures in the event of the disease being reintroduced. It is essential that countries exposed to a high risk of the introduction of smallpox—for example when the disease is regularly present in contiguous countries—should maintain an adequate degree of immunity in the population by means of vaccination of new members of the population (newborn infants, and immigrants), and by the periodic revaccination of (a) the school-age groups (up to 15 years of age); and (b) adults, especially those in areas where reintroductions are most likely to occur, and those persons who by their occupation are in frequent contact with international travellers. In view of the increasing volume of international traffic, and until such time as global eradication is achieved, the strict application of the International Sanitary Regulations is called for as the safeguard against the reintroduction of smallpox to countries where hitherto it was absent.

In Europe, 72 cases from 5 countries were reported in two years, and in every instance the infection was imported from other continents. In the African region three countries, Liberia, Ivory Coast and Mali, have planned eradication programs and have requested WHO assistance. In the Americas, Brazil and Ecuador still harbor smallpox endemic foci. In the Eastern Mediterranean Region, four countries, Pakistan, Saudi Arabia, Sudan and Yemen, have either planned or initiated eradication programs and have asked for WHO assistance. In the South-East Asia Region, four countries, Afghanistan, India, Nepal and Thailand, have either planned or initiated eradication programs and have requested WHO assistance. Other countries of the Region, including Burma, Ceylon and Indonesia, are intensifying their vaccination program. In the Western Pacific Region, smallpox is no longer endemic, according to reports issued by these countries. However, smallpox vaccination campaigns are being undertaken in Viet Nam, Cambodia, and certain other countries of the Region.

The cost of smallpox vaccination is very low. WHO (1959) estimates an average cost throughout the world for mass vaccination would be $0.10 (U. S.) per person vaccinated. India, with a population of 430 million, has estimated that the total cost of the eradication program, spread over 5 years, will be $17 million. Of this sum, $14.5 million may come from national resources, leaving

World Incidence of Smallpox, 1958–61
(By Continents)

Continent	1958	1959	1960	1961
Africa	14,403	14,155	15,851	24,140
America	4,334	4,899	3,090	1,923
Asia				
India	170,829	45,450	31,052	45,195
Pakistan	49,884	7,803	1,905	2,741
All other countries	6,516	5,234	6,284	4,406
Total	227,229	58,487	39,241	52,342
Europe	12	14	47	25
Oceania	0	0	1	0
Total	245,978	77,555	58,230	78,430

$2.5 million to be sought from international assistance (for vehicles and equipment).

Smallpox has been absent from North and Central America and the Caribbean area since 1954 (except Panama), yet between 1954 and 1957 ten countries of South America reported 32,936 cases of smallpox. During 1958–1961, nine countries reported 16,187 cases. While the United States has been free of smallpox since 1947, the introduction of a single case into New York City in that year resulted in a total of 12 cases and two deaths. Within a month, more than 6 million New Yorkers were vaccinated. Not only is the latter procedure expensive, but an antemortem diagnosis of postvaccinal encephalitis was made in 49 cases. In four instances, autopsies showed that other disease was responsible. However, among the other 45 cases there were 4 deaths which might be attributed to postvaccinal encephalitis.

In the first three months of 1962 smallpox broke out in West Europe, introduced by travellers from India, Pakistan and Liberia. There were a total of 87 cases with 12 deaths. The small epidemic initiated by a Pakistani girl in England resulted in 10 cases and 4 deaths, including the pathologist who autopsied the original case.

Smallpox is a disease where true eradication on a global basis seems quite feasible at a cost far below the continued costs of vaccination programs, which is the alternative procedure. In the Western Hemisphere the goal should be achieved within just a few years. If India is successful in eradicating the disease from its huge population, similar techniques of organization should be possible in the rest of Asia. Certain isolated areas of Africa will require assistance from outside of the newly emerging nations; but if WHO receives the support it so richly merits, the campaign could be concluded within a decade.

Tuberculosis Eradication

Soper (1962) recently discussed problems to be solved if the eradication of tuberculosis is to be realized. Tuberculosis is the most widespread of human ills, the most chronic and persistent of infections, with the longest period of infectivity of any disease, and the disease whose prevention most clearly depended, until recently, on the improvement of social and economic conditions. Perkins (1959) called for a "formal concentrated program of eradication of tuberculosis from the whole face of the earth". He defined "eradication of tuberculosis" as the "ultimate goal of having no human being on this earth react significantly to a skin test with a proper dosage of a standardized tuberculin, in other words, total bacteriologic eradication so far as tuberculosis is concerned".

Soper emphasizes the importance of accepting the absolute definition of eradication. The objective of control is to reduce the incidence of a given disease to a low level and to maintain this low level forever, whereas eradication is intended to eliminate the possibility of the occurrence of the given disease, even in the absence of all preventive measures. This definition, modified by the phrase "unless reintroduction occurs", applies also to local area, state, national and regional eradication. Soper points out that in eradication, any reduction short of the absolute leaves one preoccupied with the seeds of infection that remain. In control one tends to lose interest in a disease at the point where, in eradication, many times, the greatest difficulties are encountered. In control one may plan on a small local scale, but in eradication the plan must

include, from the start, an area of sufficient scope to minimize the threat of reinfection and must expand continuously at the periphery until all points, from which reinfection may occur, have been cleared. In control, one must count the cost as part of continuing unending annual budgets; in eradication, one may capitalize future savings over an indefinite period against the peak costs of the years required for eradication. In control, one may disregard the rights of the minority, of those living in sparsely settled areas of difficult access, but in eradication protection of all the people is essential—"and any *is* too many".

Today people who are infected or infectious with tuberculosis can be identified; there are curative and prophylactic drugs which are cheap, simple to administer (orally), can be taken at home or while employed; and physical isolation in sanatoria has been largely replaced by chemical isolation. The prevention of transmission is possible without disrupting the lives of infected and infectious individuals.

Brightman and Hilleboe (1962) have discussed the present status of tuberculosis control. Mass community x-ray screening programs are proving more costly per case as the incidence of the disease is dropping. Indiscriminate surveys of general or special population groups, covering as much of the community as possible, are wasteful. In New York State, community and special group surveys have yielded less than 10 per cent of new active cases reported during recent years. About 60 per cent of the new active cases of tuberculosis reported each year are identified as a result of such persons reporting to private physicians or clinics. Approximately 30 per cent of the new active cases of tuberculosis reported each year are found by *investigation* of the contacts of active cases.

The national outlook for achieving tuberculosis eradication is dependent upon the joint effort of private physicians, the official and the voluntary health agencies. It will be a much greater undertaking than the eradication of a vector-borne disease such as malaria, or a disease for which an adequate immunization procedure has long been available as in smallpox. The adoption of the goal of eradication of tuberculosis is important, the active participation of the practicing physician increasing his index of suspicion, his role in examining family contacts, his cooperation with official health agencies, is essential. The official and voluntary health organizations must, in many instances, redirect their campaigns of case finding, intensify their educational programs and reawaken interest in this disease, insisting that it is eradicable. Finally, let us hope that further scientific breakthroughs may enhance our prospects of success in such an endeavor.

Eradication of Other Diseases

Yaws

With the discovery of the efficacy of a single injection of penicillin in curing yaws, the Pan American Health Organization has cooperated with a number of countries in this hemisphere in undertaking an eradication program during the past decade. Substantial progress has been achieved. In the Dominican Republic the prevalence of infectious forms declined from 200 per 100,000 persons examined in 1958, to 30 per 100,000 persons examined in 1961. In Haiti, where eradication began in 1950, infectious forms of yaws declined from 100 per 100,000 persons surveyed in 1959 to 1.3 per 100,000 in 1961. In 1960 there were 336 cases reported, in contrast to over 80,000 in 1950. In Trinidad and Tobago, St. Kitts and Grenada, surveillance activities were continued but no cases were detected in 1961. The possibility of achieving eradication is considered to be encouraging also in St. Vincent, St. Lucia, and Dominica. In Colombia and Ecuador, eradication has been undertaken cooperatively by the Ministry of Health and the U. S. AID program, and was believed to have succeeded in 1961. PAHO has been requested to undertake a verification study.

Yaws is a disease in which we may anticipate successful eradication from the Western Hemisphere in the relatively near future. The suf-

ferers from the disease, because of its disfiguring qualities, are anxious to receive treatment and a single injection is efficacious. On a per capita basis it is a cheap program—10 to 15¢ (U. S.) per person treated.

Yellow Fever and Aedes aegypti Eradication

Great hope was aroused more than a half century ago that the dreaded scourge of yellow fever could be eradicated from the face of the earth. The discovery of the existence of the disease among monkeys in the jungle, about 25 years ago, changed the objective from the eradication of the etiological agent to the objective of eradication of its urban vector, *Aedes aegypti*. The accompanying map (provided by PAHO) illustrates the status of the *Aedes aegypti* eradication as of June 1961, with eradication completed in Bolivia, Brazil, British Honduras, the Canal Zone, Chile, Colombia, Costa Rica, Ecuador, El Salvador, French Guiana, Guatemala, Honduras, Nicaragua, Panama, Paraguay, Peru and Uruguay. The program is well advanced in Mexico and is progressing well in Argentina, Venezuela, and Cuba. A few cases of jungle yellow fever are reported each year in the Americas. PAHO listed a total of 83 in 1961 from the following countries: Bolivia, Brazil, British Guiana, Colombia, Peru, and Venezuela.

In view of the enormous increase in air travel to and from countries in Latin America and in Africa in which yellow fever virus continues to exist, it is important that the urban vector, *Aedes aegypti*, be eradicated, at least from this hemisphere. The fact that this mosquito is still common in nearly one-sixth of the United States (Southeastern sector) makes it urgent that our country initiate an *Aedes aegypti* eradication campaign at the earliest moment and that it be prosecuted vigorously. The possiblity of reintroduction of this mosquito from our nation into one of the nearby nations is truly alarming. Central America has completed, successfully, its campaign and the work in Mexico is well advanced. The vector has been eradicated from 80 per cent of the originally infected area in the Americas.

Yellow fever continues as a serious threat in a number of countries of Africa. In southwest Ethiopia, in the province of Gamu-Goffa, an epidemic was recognized in early February of 1961. Probably about 3000 deaths due to yellow fever had occurred in the province at the beginning of the year. The disease had been reported in areas situated farther to the north and close to the border with the Sudan. Four cases were reported in the Congo in 1961.

Vaccination appears to be the only way to control jungle yellow fever. People who live and work in or near infected forests require the vaccine. Also temporary workers or travellers who enter such forest areas to exploit oil, mineral, or other natural resources should be immunized. PAHO reports nearly half a million vaccinations in 19 of the Latin American countries in 1960, principally in countries in which yellow fever occurs.

Miscellaneous human diseases

With the discovery of the efficacy of penicillin in the treatment of syphilis and the establishment of rapid treatment centers at the end of World War II, many public health people considered syphilis eradicable. The dramatic increase in the past three years, however, tends to make one cautious of this philosophy. The Surgeon General of the U. S. Public Health Service recently appointed a Task Force "to evaluate present efforts to control syphilis and to recommend principles and methods that will make it possible to establish a timetable leading to the eradication of syphilis as a public health problem". Their report pointed out that 18,781 persons with infectious syphilis in the United States during fiscal year 1961 were the greatest number of such cases reported in any year since 1950, and that a 50 per cent increase has been reported per year for each of the past two years. They believe that a directed coordinated attack on infectious syphilis can stop its spread, and that if the attack is permitted to continue unabated for at least ten

years, it will eliminate syphilis as a public health hazard in the United States. "No public health effort in modern times demonstrates more dramatically than the control of syphilis the results of failure to follow through on a successful program, the results of reliance on "miracle" drugs rather than on case finding and proven public health practices, and the results of over-hasty budget reduction."

Poliomyelitis will have to be given serious consideration for eradication if the administration of poliomyelitis oral vaccine continues to substantiate its early promise.

Trachoma is a very disabling disease, affecting several hundreds of millions of people, which would be worthy of global eradication effort with some advances in immunotherapy or chemotherapy.

Cholera still remains a dangerous threat, despite the fact that as an endemic disease it appears to be restricted to East Pakistan, India, and a few other areas.

Special Aspects of Eradication Program

In today's "jet propelled" way of life, eradication of any human disease must be contemplated on a global basis. The practical certainty of reintroduction of the disease or its vector makes it unrealistic to consider anything less than the entire world as the ultimate objective. Realistically, eradication must be undertaken, during its earlier stages, on a broad regional basis. Often a big country may be too large a unit to start simultaneously, but the campaign, wherever started, should expand from the center and gradually enlarge until the entire area is encompassed. Geographical boundaries are very illogical parameters of an eradication program, and so of necessity it must be an international undertaking. This further complicates the scheduling of the campaign since cleared areas are exposed to the threat of reintroduction from tardy neighbors and must maintain costly surveillance procedures.

Eradication must be an orderly, continuous undertaking. Concentrated effort of short duration will not achieve the objective and will only enhance the eventual cost because much of the cleared area may have to be retreated. A realistic planning of expansion, in line with available trained personnel and financial resources, must dictate the speed of the undertaking. On the other hand, there is a minimum rate of progress that must be assured or else the eradication will not be achieved. This will vary from disease to disease. Smallpox eradication can utilize relatively unskilled personnel and should be undertaken as a "rapid fire" campaign. Such a campaign theoretically could be completed in five years. Malaria eradication will demand a minimum of eight years in a given area.

Eradication schemes inevitably come into conflict with human rights. They rely on such items as compulsory immunizations, mass chemotherapy, entry into private dwellings for inspection purposes and spraying of these habitations, the taking of samples for diagnostic purposes, etc. Suitable enforceable legislation is essential. Theoretically, education of the public should pave the way for the campaign, but violation of human rights and privileges is not popular. The active enthusiastic support of the campaign by each individual is highly desirable; where this cannot be obtained, forceful persuasion may be essential.

Unfortunately, political stability may play a key role in failure to achieve a goal such as eradication. A government may commit itself, in all sincerity, to the objective, but when it is replaced, peacefully or otherwise, the new administration may have less devotion to the campaign. Such a reversal is catastrophic, not only for the particular country but for its neighbors. It must also be recognized that certain other political influences can supervene. For example, there is every reason to believe that the brutal attack on Vietnamese malaria spray crews by the Viet Cong was a deliberate, planned assault on a successful health program being undertaken and supported jointly by the Vietnamese Government and the foreign aid program of the United States.

In discussing malaria eradication, special

emphasis was directed toward the importance of adequate organization and the semimilitary aspects of the campaign. The importance of training everyone associated with the endeavor was stressed. In many of the "developing" countries the scarcity of personnel with competency in or feeling for administrative skills presents a terrific handicap. The economic requirements for supporting an eradication program are frequently appalling. There may be a few exceptions, as in the case of yaws, which has a rather limited geographical distribution, and cost may be considered quite reasonable as in the case of smallpox when it is recognized that relatively few professional workers are required.

It is only when we consider that eradication is a "one-time" undertaking and that enormous savings for eternity (?) may accrue that we can justify the commitment of a billion dollar program. This automatically places such programs in the realm of international undertakings, and the financial support must come from outside the country. Estimates as low as $0.10 (U. S.) per capita for smallpox eradication have been made by WHO, or about $100 million (U. S.) for people living in endemic areas.

Cockburn (1961) has pointed out that eradication can be regarded as that state in which the infection does not return from infected areas after control measures have been abandoned. If procedures have to be continued to prevent return of infection, then the state is one of control and not eradication. The occurrence of animal reservoirs of human infection in nature makes the eradication of such diseases extremely difficult or unlikely. Thus bubonic plague, if it were solely a disease of man and his domestic rats, would be subject to eradication. The occurrence of this disease in a number of wild mammals makes the eradication of the disease highly unlikely at our current state of technology. Certain of the typhus fevers may well be subject to eradication, but others, e.g., scrub typhus, would be extremely difficult. Rabies, except on an insular basis, is probably impossible. This is a misfortune, especially when we remember that England achieved it by animal quarantine in 1896.

The significance of surveillance has been stressed in the section devoted to malaria eradication. The importance of early recognition, reporting and control is paramount. International quarantine and exchange of intelligence information regarding the occurrence of certain infectious diseases cannot be overemphasized. The United States has set up a Board for the Containment of Smallpox Outbreaks. The basic philosophy, until other countries of the world make further progress in the elimination of this disease, is the maintenance of a high level of immunity, especially universal vaccination in the first year of life; the maintenance of a serious "watch on the borders", and the giving of special attention to maintaining of immunity of airport and dock personnel, hotel employees and hospital attendants. The importance of continuing an eradication program to its logical termination cannot be over-emphasized. The experience with yaws in Haiti and Jamaica (PAHO, 1959) is illuminating.

Selection of Human Diseases for Eradication

It would require a bold person to draw up a list of human diseases in order of priority for initiation of campaigns of eradication. Yet there are certain criteria which must be met before eradication can be envisioned. Probably the first principle would be the availability of a measure which is technically feasible. Thus one might say that smallpox vaccination is an appropriate means for the undertaking of eradication of that disease; that DDT or other synthetic hydrocarbon insecticides applied as a residual spray to the inside surfaces of human habitations for a 3 or 4 year period will lead to the eventual eradication of malaria; that penicillin may eradicate yaws; that a combination of anti-*Aedes aegypti* measures and immunization of those exposed to jungle yellow fever will eradicate the urban form of the disease. The

case for oral attenuated live polio virus is good and demonstrations may shortly establish it as a technically feasible undertaking. A combination of antituberculosis measures have given hopeful encouragement as to the possible elimination of this dread scourge, but probably we must think in terms of decades.

An important guide will be the economic consequences of failure to eradicate. No doubt this was the most important single factor in the selection of malaria eradication for the highest priority by WHO, UNICEF, the U. S. Technical Assistance programs (AID), and the individual countries concerned. Both in terms of mortality and morbidity this was the greatest human plague. Already vast sums were being expended annually directed to its "control". This was not being achieved and indefinite appropriation was the alternative. The decision to make a large "capital" expenditure over a limited period of time was reached. History will no doubt demonstrate the wisdom of this decision. A disease such as poliomyelitis would not achieve as correspondingly high a priority as certain others. On the other hand, the cheapness, ease of application, and the potentially devastating after-effects to a limited percentage of its victims may well lead to a decision to eradicate.

The geographical extent of the infection is of great consequence. While no effective eradication procedure appears to be at hand currently in the case of cholera, technological advances may promptly be achieved and their application to rather limited areas of South and Southeast Asia would be indicated. The current progress in smallpox eradication from most of the Western hemisphere and Western Europe enhance the priority for the ultimate global campaign. The definition at the outset of this paper does not contemplate regional eradication, except as an intermediary stage, but eradication of limited foci might be encouraged, as in the case of schistosomiasis in India, Thailand, the Philippines, etc., since the disease has demonstrated a propensity to spread in Africa and in the Near East.

International Aspects of Disease Eradication

There has been frequent reference to the global implication of the concept of eradication. The World Health Organization is composed of 115 member states and its projected budget for 1963 is $29,956,000. This is the logical agency for the sponsorship of health programs such as eradication. Its limited budget does not permit major financing of such costly campaigns, but its staff have made enormous contributions in the planning of national and regional action programs of eradication. Such other international organizations as the United Nations Children's Emergency Fund (UNICEF) have given significant financial support to eradication of malaria. The more fortunate nations of the world should give increasing financial backing to such worthy undertakings as eradication.

The National Citizens Committee for the World Health Organization was launched jointly by the National Health Council and the American Association for the United Nations in 1951. It carries on an educational and informational program, furnishing literature, films and speakers on world health and holds regional conferences yearly. To call public attention to the World-wide Malaria Eradication Campaign, postal authorities of 96 nations to date have each issued a special commemorative postage stamp and related philatelic materials. Thus private citizens may support disease eradication programs as well as through governmental contributions to WHO budgets. The U. S. postage stamp issued on March 30, 1962, bears the slogan, "World United Against Malaria".

Summary

Eradication of a limited number of human diseases seems entirely possible. Very substantial progress in the global eradication of malaria and smallpox has already been achieved. Promising work has been accomplished in the direction of regional eradication of other human infections. Surveillance is developing as a new technic in our public

health armamentarium. I am bold enough to forecast that at least half of this audience will live long enough to witness complete eradication of malaria and smallpox from the face of the earth, and probably the near completion of eradication of several other important human plagues. Public support on an international basis will be essential to this goal.

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Robert Hamill Nassau (1835–1921): Apostle to Africa[1]

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THE recent election of Dr. Albert Schweitzer as an Honorary Fellow of the College of Physicians of Philadelphia directed attention to Equatorial West Africa where, over a century ago, Dr. Robert Hamill Nassau, a native of Pennsylvania, began forty-five years' service as a medical missionary. From 1861 until 1906, this heroic Presbyterian apostle labored in darkest Africa, establishing several Christian outposts in what is now the Gabon Republic. It was Nassau, in 1876, who founded the mission station at Lambaréné, a hospital-village subsequently made world-famous by his Alsatian successor.

Dr. Schweitzer tells us, in his autobiography *Out of My Life and Thought*, that on arriving at Lambaréné in 1913 he wrote to his predecessor: "Great was the joy of Dr. Nassau, the aged founder of the mission station at Lambaréné, when I sent to him in America the news that it was once more supplied with a doctor." Also, in his *African Notebook*, Albert Schweitzer acknowledged the priority of Dr. Nassau at this dangerous post on the Ogowé River in the Gabon: "The *Pioneer* . . . originally belonged to Livingstone. The British Government had given him this fairly large paddle-steamer in 1861 for his journeys on the Zambesi. But she drew too much water to be suitable for that river, and . . . was acquired by the firm of Hatton and Cookson and brought to the Ogowé. She it was that in 1874 brought the first American missionary, Dr. Nassau, up the river." The life and work of this pioneering American is also timely because of present interest in the emerging nations of Africa.

Robert Hamill Nassau was born at Montgomery (Center) Square, Pennsylvania, on October 11, 1835. He was the sixth child of the Rev. Charles William Nassau and his wife, Hannah McClintock Hamill. His father, pastor at Norristown, Norriton and Providence Presbyterian Churches, became Professor of Ancient Languages at Lafayette College in 1841, and president in 1849–50. He left Easton to become Principal of the Lawrenceville (New Jersey) Female Seminary, serving in this post until 1874. His wife's brothers, the Reverends Hugh H. and Samuel M. Hamill, were teachers in what is now the Lawrenceville School for Boys.

As a child, Robert Nassau later related, he wanted to attend West Point, but a military career was discouraged by his parents. He entered Lafayette College as a freshman, on his fourteenth birthday, then transferred to the Lawrenceville School for one year, graduating as valedictorian of his class in 1851. Admitted to the College of New Jersey at Princeton as a sophomore, he was a member of the American Whig Society, an oratorical group, and received his A.B. degree in 1854. During the next two years he taught at the Lawrenceville School, and in 1856 entered the Princeton Theological Seminary. He received an A.M. degree at Princeton in 1857, and graduated from the Seminary two years later. During the summer vacation of 1857, Nassau was a colporteur for the Presbyterian Board of Publication in western Missouri and adjacent parts of Kansas. In the following summer, he served as a missionary of the Philadelphia Sabbath Association, operating on the Pennsylvania Canal between Columbia and Harrisburg. Enrolled as a ministerial candidate under the care of the Presbytery of New Brunswick, he was licensed by that body at the First Presbyterian

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Fig. 1. Rev. Robert Hamill Nassau, M.D., S.T.D
(Bureau of Alumni Records, Princeton University)

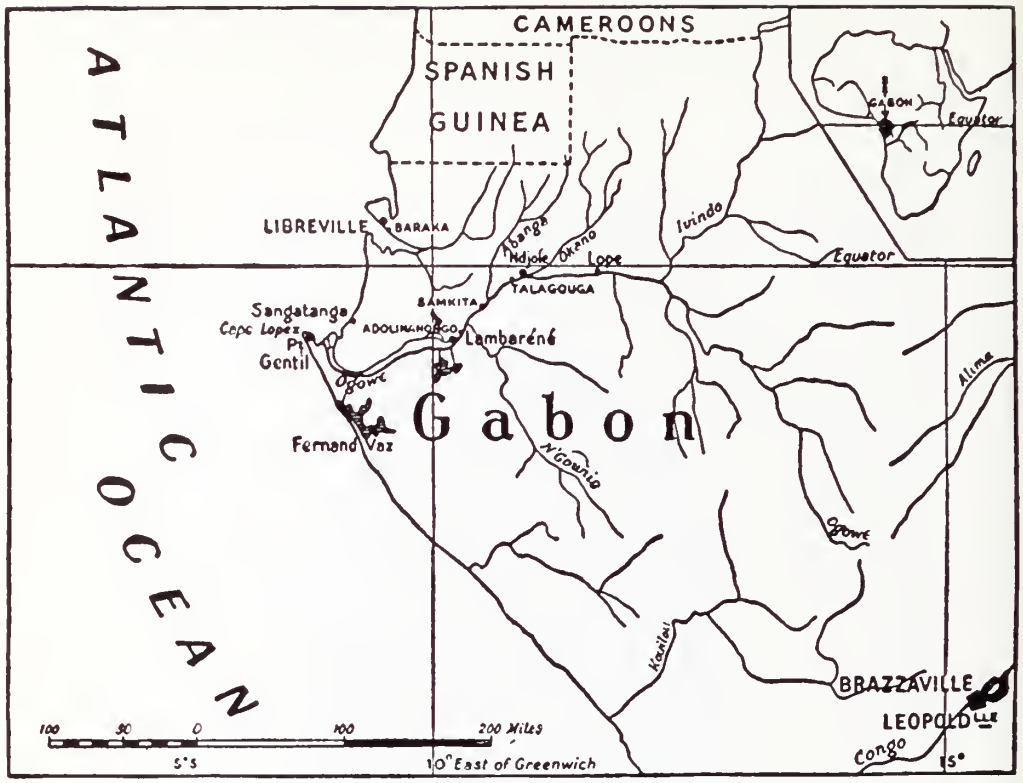

FIG. 2. From *African Notebook* by Albert Schweitzer.

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Church of Shrewsbury, New Jersey, on April 29, 1859.

In 1859 Nassau asked the Presbyterian Board of Foreign Missions to send him to its most difficult post. He was appointed to the Corisco or West African Mission, situated a degree north of the Equator. To prepare himself further, he began medical studies at the University of Pennsylvania, receiving his M.D. degree in 1861. His manuscript medical thesis, *De officiis adipis* (*The Functions of Fat*), is in the University of Pennsylvania Library.

In an autobiographical essay, *A Medical Course that was Worth While* (1915), Dr. Nassau recalled that he was warned by friends of the risks involved in African service.

> Many of my acquaintances protested to me. And some said, "What a fool you are, Nassau, to go to Africa to die!"
>
> I quietly determined not to die. . . . I determined to study medicine . . . to obtain such a sufficient knowledge of anatomy, physiology, therapeutics, etc., as to be able to make a clinic of myself. . . .
>
> So the very next day after my graduation at Princeton, I began with Dr. White, the Lawrenceville, N. J., village doctor, daily lessons in medicine. And in the fall, when the Medical Department of the University of Pennsylvania opened, I came to Philadelphia and entered my name as a student. . . . At that time, three years of study were required for a diploma. Because of my diplomas from Princeton University and Seminary, the Faculty allowed me to compress the course into two years. . . . I received my diploma with the Class of 1861; . . . the education it represented was of great use to me in my mission-life. . . .
>
> All my treatment of disease, for myself, was *preventive*. And, unexpectedly, I had to be of service to others, natives, traders, and fellow-missionaries, where there was no other physician. . . . Though as an explorer, during part of my mission-life, I was more exposed than any of my associates, I had less fever than they. And when I left Africa in 1906 there were only two white missionaries in that entire continent who had a longer record than I; one in South Africa, the other in Egypt, both of them climatically better than I.

Dr. Nassau added that by careful living he was also able to marry and rear children in tropical Africa—a feat previously deemed impossible for missionaries because of health hazards there.

On April 17, 1861, Nassau was ordained to the ministry at the First Presbyterian Church of Cranbury, New Jersey. He sailed for Africa on July 2, landing at Corisco Island on September 12. In this location, part of Spanish Guinea inhabited by Bantu tribes, there had been American missionaries since 1842. On Corisco Island, four miles long and three miles wide in the Gulf of Guinea at the mouth of the Muni River, Nassau headed the Girl's School and preached at the native church for four years. From this headquarters of the Presbyterian mission he also travelled over a wide stretch of mainland coast. He was married on September 17, 1862, to Mary Cloyd Latta (1837–1870), daughter of Dr. and Mrs. James Francis Latta of Chester Valley, and a missionary from Pennsylvania, who died at Benita, West Africa, eight years later. The bereaved husband eulogized his wife in a book, *Crowned in Palm-Land* (1874). Three sons were born to them: William Latta Nassau (1864–1950), musician and teacher at Philadelphia, Pa., and Glassboro, N. J.; George Paull Nassau (1866–1867), who died, like his mother, in Africa; and Dr. Charles Francis Nassau (1868–1940), later a distinguished Philadelphia surgeon and a Fellow of this College.

After mastering the Benga dialect of the Bantu tongue, Robert Nassau took charge of the mission's first mainland station in 1865, at Benita, fifty miles north of Corisco. Here he worked for six years, prepared a geography of the West African coast published in France in 1869, and revised a Benga grammar. Going out to preach along a hundred miles of coast, he penetrated an equal distance up the Benita River. The mission's sailing cutter was named "Nassau" in his honor. In his writings we read of the perils of this location: dangers to health and life from torrid climate, wild animals, hostile natives, malaria, sleeping sickness, dysentery, and other tropical diseases. The slave trade, then still active in that area for the African and the South American markets, was described by the French-American explorer Paul du Chaillu in his book, *Explorations and Adventures in Equatorial Africa* (London, 1861).

During a furlough in the United States in 1872–73, Dr. Nassau was authorized to found a missionary station in the interior, a project which native opposition had thus far prevented. This station was to be established in the Gabon, a French protectorate whose capital, Libreville, located a few miles north of Cape Lopez, was so named because it had been settled in 1849 by escaped slaves. In 1874, Nassau ascended the Ogowé, which enters the Atlantic seventy miles south of the equator, below Port Gentil, and established two permanent missionary centers—Kångwe (Lambaréné) and Talagouga—the furthest 200 miles up the river. Serving for seventeen years in this region, an area known for its cannibals and gorillas, he learned the Mpongwe and Fang (Pahouin and Galoa) dialects, organized four churches, and translated parts of the Bible into the native tongues. A capable philologist, Nassau rendered portions of fifteen books of the Old Testament into two dialects of the Bantu-Benga language, these being published by the American Bible Society in 1900.

Trader Horn, a colorful British merchant bartering on the Ogowé at the time, recalled "the Old Dr. of that Presbyterian Mission station" in recollections published in 1927. The English trading firm of Hatton and Cookson, about 1865, had sent 'Alfred Aloysius Horn' from Liverpool to manage a trading post at Adolinanongo, from where he travelled the Ogowé area for twenty years. Horn mentions the Doctor as one of several pioneer white men, the others being ivory and rubber traders. On one occasion, Horn related that Dr. Nassau became a local hero by "a plucky deed"—rescuing a boy threatened by savage tribesmen.

Charles R. Joy and Melvin Arnold, in their book, *The Africa of Albert Schweitzer* (1948), tell of Nassau's first settling at Lamba-

réné, his clearing the ground and planting native fruit trees there—orange, lemon, mango, pawpaw, coffee, cocoa, and oil palms.

On what is now known as the American Hill at Anende—the first site of Albert Schweitzer's hospital—Dr. Nassau, the first American Presbyterian missionary, built his house in 1876. It was a steep twenty-minute climb through the jungle to the top, from which a glorious view up the broad Ogowé River spread out. This site was chosen for safety and seclusion from the jungle and the natives. . . . Three times the hostile natives had burned Dr. Nassau's home and stolen his books—which are still found in widely-scattered villages. He therefore moved from an early site at the base to the top of American Hill. Undaunted he began again. Schweitzer moved into this house in 1913, today the foundation stones of his hilltop house are all that remain of his home.

On a furlough in 1881, Dr. Nassau was married on October 10, at Lakewood, New Jersey, to Mary Brunette Foster (1849–1884), daughter of the Rev. and Mrs. Julius Foster, of Towanda, Pennsylvania. A daughter, Mary Foster Nassau, was born on August 7, 1884, at Talagouga, the African post where her mother died the following day. The Doctor later memorialized his second wife in a book, *The Path She Trod* (1909). Miss Mary F. Nassau later spent many years with the National Office of the Presbyterian Church in New York City.

Relieved in 1891, Dr. Nassau spent two years in the United States. In June, 1891, the University of Pennsylvania conferred upon him the honorary degree Doctor of Sacred Theology. He served as Moderator of the Presbyterian Synod of New Jersey in 1892, then had three more terms in Africa, in 1893–98, 1900–03, and 1904–06. In these intervals he served as a pastor for five years at Libreville, and for three years at Batanga. The latter settlement, in the German Kamerun, was situated on the coast one hundred and twenty-five miles north of Corisco. While at Batanga, his duties were so arranged as to allow him to write his remarkable book on ethnology, *Fetichism in West Africa: Forty Years' Observations of Native Customs and Superstitions* (1904). This volume is a treasury of information on aboriginal magico-religion and sociology.

The French Government having decreed, in 1892, that all instruction in the Gabon be given in French, the American missionaries in that region relinquished their work to the Paris Missionary Society. In 1906, as a farewell gesture, Dr. Nassau revisited the mission stations on the Ogowé where he had worked earlier. His visits were fondly reported by a French missionary, D. Couve, writing from Talagouga on January 26, and published in the *Journal des Missions Evangéliques*, Paris, **81:** 270–271, April 1906. (It was an appeal in this *Journal*, Albert Schweitzer tells us, that prompted his decision to serve as a missionary in tropical Africa.) In 1906, when he retired, Robert Nassau had completed forty-five years of service to Africa. In the same year his sister, Isabella Ann Nassau (1829–1906), a devoted companion, died at Batanga, after thirty-eight years of missionary work in West Africa.

During 1907–08, Robert Nassau had charge of Presbyterian churches at Starke, Waldo, and Hawthorne in Florida. During his furlough he made many missionary speeches, wrote extensively, and became a well-known and striking figure in ecclesiastical meetings. He was a member of the Presbyterian General Assemblies in 1872, 1873, 1880, 1881, 1892, 1893, and 1900. Dr. Nassau was vice-president of the Interdenominational Medical Missionary Conference when the fifth meeting of this group was held at Battle Creek Sanatorium in Michigan, December 31, 1912–January 3, 1913. In 1914 he led the Alumni Parade at Princeton—at the sixtieth reunion of his college class. His last eleven years, in which he wrote several books, were passed at the Mercer Home for Presbyterian Ministers, at Ambler, Pennsylvania. There he died of bronchopneumonia on May 6, 1921, in his eighty-sixth year. His remains now rest in the family burial plot in the Lawrenceville Cemetery in New Jersey. An inscription on a granite memorial there notes that he was "for 45 years a faithful missionary in Equatorial West Africa at Corisco, Benita, Gaboon,

Batanga on the coast, and pioneer of the Ogowe River at Kangwe and Talagouga. 'He preached unto them Jesus and the Resurrection'."

In retrospect, Dr. Nassau was an effective apostle because of his linguistic ability, religious zeal, medical knowledge and skill in managing the natives through an understanding of their customs and thoughts. Although conventional in his piety, he was ahead of his time in using industrial methods for missionary purposes. He said that he could evangelize with the help of a hoe or a saw-mill, and used educational, medical and printing methods to carry out his task. A trusty Winchester rifle is often mentioned in the accounts of his labors. His missionary activities were described, often vividly and in detail, in books of which the most important are: *Corisco Days: The First Thirty Years of the West African Mission* (1910), *Tales Out of School: Schoolgirl Tales of a Presbyterian Mission at Libreville, West Africa* (1911), *Where Animals Talk: West African Folk-Lore Tales* (1912), *In An Elephant Corral and Other Tales of West Africa* (1912), and *My Ogowê: Being a Narrative of Daily Incidents During Sixteen Years in Equatorial West Africa* (1913). The last-named book is a volume of over 700 pages. Shorter reports such as, *Spiritual Beings in West Africa: Their Classes and Functions* (1903), *Africa: An Essay* (1911), and *Bantu Sociology* (1914), are also valuable.

Dr. Nassau sent home many botanical, entomological, ethnological and zoological specimens. In October, 1890, he sent to Philadelphia, in trade rum and zinc chloride solution preservative, the first perfect specimens of gorilla brains available for microscopic study; earlier comparative anatomical studies at Leipzig, Germany, had been done on imperfectly preserved material. His friend, Dr. Thomas G. Morton, mounted a gorilla skeleton, prepared from a carcass Nassau sent from Africa, for the Academy of Natural Sciences. (This gorilla had been killed by voracious driver ants.) The first specimen of an "eye worm" (*Loa loa*) and other tropical parasites, insects and reptiles were sent by Dr. Nassau to Drs. Joseph Leidy and Thomas H. Montgomery at the University of Pennsylvania. A large collection of anthropological specimens gathered in West Africa by Dr. Nassau were exhibited at the Chicago Exposition in 1893. Botanical specimens from Africa were also displayed at Horticultural Hall in Philadelphia's Fairmount Park. Today one can see items contributed by Dr. Nassau at Guyot Hall of Princeton University, the University of Pennsylvania Museum, and the Philadelphia Academy of Natural Sciences.

Dr. Nassau summarized his medical experiences in Africa, at the invitation of Dr. Morton, in a paper read before the annual meeting of the Academy of Surgery of Philadelphia on January 4, 1892. This report, *Observations Upon Native Diseases Seen During Thirty Years' Residence in Equatorial Africa*, was published in *The Times and Register: A Weekly Journal of Medicine and Surgery*, **14:** 109–111, January 30, 1892. In this article the author discussed various topics: eczema, ulcers, syphilis, fractures, elephantiasis, club foot and other deformities, hypertrophies, wounds, dropsy, tumors, leprosy, and abscesses. These topics, moreover, reflected the brutality and misery of the tribal Negroes. The paper was reprinted in a volume, *Progress in Surgery in 1891*, edited by Dr. Morton in the following year. Dr. Nassau described dire illnesses met among the African natives, conditions subsequently emphasized by Dr. Schweitzer.

Robert Hamill Nassau, like his medical predecessors, the explorer Mungo Park (1771–1806) and the missionary David Livingstone (1813–1873), and his successor, Albert Schweitzer (1875–), devoted his life to the needs of Africa. Dr. Nassau illustrated in his life these Biblical words: "By faith he sojourned in . . . a strange country." (Hebrews **11:** 9). "And he went about . . . teaching . . . and preaching the gospel of the kingdom, and healing every disease and infirmity among the people." (Matthew **4:** 23).

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Some Facets of Mediaeval Arabic Pharmacology[1]

By MARTIN LEVEY, PH.D.[2]

"Man does not study to reach the furthest bounds of knowledge but to gain that of which ignorance cannot be tolerated."

Mediaeval Arabic saying.

THE Golden Age of Arabic science may be taken as the period from the ninth to the twelfth century and perhaps to the thirteenth century. In pharmacology, however, its dominant position in western Europe lasted until the beginning of the nineteenth century. The written legacy of the Muslims, over 600,000 extant manuscripts, is now spread from depositories in India to those in western Europe and from Leningrad to Nigeria and the new East African states. Approximately one seventh to one sixth of these is on science or on a science-related subject.

Why are Arabic medicine and science of such great interest and importance? One reason is that the Muslim world for most of its Golden Age aided and supported these studies in a period when western Europe was experiencing an almost unfathomable decadence. It was the Muslims who contributed so much to the rebirth of this part of the world. Further, the Arabs were responsible for the considerable development of chemistry and pharmacology, both theoretically and practically. The Arabs first established hospitals much like those we know today, developed licensing procedures of medical practitioners by legal authorities, used relevant teaching illustrations in medical works, and raised the practice of medicine from a menial to a learned profession.

One of the more fascinating aspects of the history of Arabic medicine is concerned with the paths of transmission of this subject from the ancients to the Muslims and later from the Muslims to western Europe. Closely allied are studies concerned with the relative importance of the various sources of Arabic medicine and pharmacology. Two of the questions most frequently posed are, "How dependent were the Arabs upon Greek medicine?" and correlatively, "Did the Muslims display originality in their work or were they merely transmitters of knowledge?"

These queries translated into the pharmacological area demand an appraisal of Galen and Dioscorides, and of the ancient Indian and Babylonian materia medica in so far as they affected the development of Arabic studies in this field. This article is therefore addressed to partial answers, where possible, of these significant problem questions.

Accordingly, information pertinent to these questions has been sought along three general lines of investigation. The first direction is to determine the kinds of literary models used by the Muslims in pharmacology and their relation to those used previously. Second, the etymology of hundreds of terms from the Arabic materia medica has been determined and analysed to obtain the relative number originating in the Indian and Persian, Mesopotamian, North African, and Greek pharmacopoeias. Third, the theoretical ideas of al-Samarqandī (d. 1222) have been studied in relation to pre-Arabic writings to determine the original steps, if any, that were made by the Muslims beyond the powerful humoral ideas of earlier antiquity.

Literary Models of Texts

Every age in the development of history from about 3400 B. C. on has brought forward its own forms into which its knowledge was cast. For example, in Babylonia, the Sumerians, Akkadians, and later the Hittites organized

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their material into list forms. In these lists, related words were listed together as a first attempt to organized facts on science and other subjects. For instance, the *ḪARRA-ḫubullu* lexical series written in cuneiform are composed of a number of clay tablets. Tablets 3–7 give the names of trees, parts of trees, products of trees, and wooden objects; tablets 8, 9 give names of reeds and objects made of reeds; tablets 10–12 give names of vessels, ovens, clay objects, hides, chemicals, objects of bronze, copper, silver, and gold; tablet 16 contains names of stones; and tablet 17 has the names of plants. In the medical field there are on other tablets lists of anatomical terms, terms for diseases, pharmaceuticals, and types of symptoms.[1]

A typical disease list in Sumerian and Akkadian is as follows:

Sumerian	translation	Akkadian	translation
DUB	comes out	šu-ú-lu	comes up
DUB	comes out	um-ṣa-tum	sore
GUG.SU.GUG	increasingly light	pi-in-du-ú	pustule
SU.UM	flesh	ḫa-šá-lu	to rub
SU.TAB	a sickness	um-ṣa-tu	paralysed hand
UM.DU$_{11}$.GA	excresence	ka-tar-ru	dry rot

These lists contained not only all the known words representing technical things or actions but, more importantly, pictured the status of the ancient type of synthesis and understanding of science and medicine.

From Greek times there is the text of Dioscorides on Materia Medica where each drug is treated separately giving its origin, description, and pharmacological uses of the morphological parts. It is divided into five major books: aromatics, oils, resins and trees; animal products and sharp herbs; roots, juices, and herbs; drugs useful for poisons; vines, wines, minerals and stones. Galen wrote books on the strength of purgative drugs, on simple drugs, on compound drugs, on nutritive drugs, drugs which purge and improve, and three more relating to theriacs.[2] The medical encyclopedia of Paulos Aegineta (fl. *ca.* 640) contains much pharmacology in the seventh book on simple and compound remedies. The simples are arranged alphabetically together with their properties and uses. Paulos took his material on this subject mainly from Galen who, in turn, owed much to Dioscorides. The compound remedies fall into such groupings as purgatives, salves, emmenagogues, antidotes, pastilles, powders, mouth salves, sweet drinks, collyria, plasters, oils, and aromata.[3]

The Muslims, on the other hand, elaborated on the Greek classification and originated new major types of pharmacological literary models. The Muslim approaches to pharmacology became not only more numerous but more flexible. Since the pharmacological literature flowered into works which considered the subject from a great variety of new directions, there resulted new understanding and new lines to investigate.

Arabic pharmacological texts may be divided mainly into those bearing directly on the subject and others which are closely related. In the case of the latter which reveal much of the Arabic materia medica, there are many works on travel, the *ḥisba* which is the common law regulating particularly medicine and pharmacy, medical biography and bibliography, botany, zoology, the lapidaries, and others.

Since the Muslims were excellent organizers of knowledge, their purely pharmacological texts were carefully directed along many directions. As a result, these books generally fall into more or less well delineated groups. Some of these major types of Arabic pharmacological literature may be categorized as follows:

1. Medical formularies
2. Books on poisons
3. Synonymic lists of simples usually in alphabetical order
4. Tabellar, synoptic treatises
5. Alphabetical lists of materia medica in-

cluding therapeutic considerations and opinions of various writers on the subject
6. Substitute drugs
7. Methods for testing drug purity
8. Works on drugs for particular diseases as for the heart, eyes, sexual organs, and others

In the case of medical formularies, there are varied types. One of these is the abbreviated text on "Compounded drugs used in most ailments." It is called *Mukhtaṣar fī al-adwiya al-murakkaba al-mustaᶜmala fī akthar al-amrāḍ.* Included in this book are chapters on myrobalan confections, electuaries, pills, aperients, pastilles, powders, syrups, lohocks and robs, gargles, collyria, suppositories, pessaries, cataplasms, oils and lotions, oral medicines and dentifrices, and pomades.[4]

A better known example of the medical formulary and from which much of the preceding one was taken is *Al-dustūr al-bīmāristānī fi'l adwiya al-murakkaba* of Abu'l Faḍl Dā'ūd b. a. al-Bayān al-Isrā'īlī (b. 1161). Bayān practised in the famous Nāṣir Hospital in Cairo. This treatise is divided much like the previous one of Sahlān.

Al-Kindī (9th cent.) also wrote a text of this type called *Aqrābādhīn.*[5] It is a compilation of prescriptions falling into the same general categories as those of Bayān and ibn Kaysān. A book of the thirteenth century by al-Samarqandī (d. 1222) called *Kitāb al-qarābādhīn ᶜalā tartīb al-ᶜilal* is also arranged on the order of the previous text.[6]

Texts on poisons are very old and were known to the Greeks and Indians. An early one in Arabic is *Kitāb al-sumūm* of ibn Waḥshīya (fl. before 912). The author was born of an Aramaean family in Iraq. He was much interested in agriculture, alchemy, and in the occult sciences generally. His book on poisons is allegedly a translation from Syriac authors, Yārbūqā and Sūhāb Sāṭ, whose works came originally from Indian and perhaps old Babylonian sources. Ibn Waḥshīya gives many names of poisons known today as mythical. Antidotes to ward off the supernatural poisons are described.[7]

There are many alphabetical lists of materia medica in the Arabic literature. These generally include the preparation, description, therapeutic usage and the opinion of other writers on the drugs. Although most of these are based on the organization and on much of the contents of Dioscorides' famous book, nevertheless, the Arabic works are much fuller both in the number of drugs discussed and in the length of the particular discussions.

Ibn al-Baitār (thirteenth century)[8] is probably the best known writer in Arabic who followed the Greek pharmacological tradition. It is known, however, that much of his compilatory work is based on the earlier treatise of al-Ghāfiqī (twelfth century).[9] This text is a compilation from older authors as Dioscorides, Galen, abu Ḥanīfa (d. 895), al-Rāzī (d. 923/4), ibn Sīnā (980–1037), al-Majūsī (d. 994), ᶜĪsā b. ᶜAlī (ninth century), al-Bīrūnī (973–1048), al-Idrīsī (1100–1166), Maimonides (1135–1204), ibn Jazla (d. 1100, ibn Riḍwān (*ca.* 980–1060), and others.

A typical entry in the abbreviated version is that of *utruj.*[10] The authors quoted are abū Ḥanīfa, Dioscorides, ibn Sīnā, Galen, ibn Māsawaih, Isḥāq b. Sulaimān al-Isrā'īlī of Qairawān. The text gives a Greek synonym, botanical and therapeutic facts, and also some physical properties of the plant products.

As excellent synthesizers of knowledge which was then growing by leaps and bounds, the Muslims were fond of building tables for their data to give a ready reference form. An excellent example of this is the work of ibn Biklārish (fl. 1106) called *Kitāb al-Mustaᶜīnī.*[11] In the first column of each double page, the following information is given for each drug: name, Galenic nature and grade, synonyms in Persian, Syriac, Greek, Latin, and Spanish, substitute drug, preparation, therapeutic value, and uses of the drug.

Names of the Muslim Materia Medica

In the linguistic study of mediaeval Arabic botanical terms, or botanonymy, as it may be called, the results are interwoven with the cultural and scientific origin of early mediaeval chemistry and medicine and the relative im-

portance of the paths of transmission of ancient study in these two fields.[12]

Wherever possible, the original texts mainly in hieroglyphic Egyptian, Akkadian, Sumerian, Turkish, Persian, Sanskrit, Hebrew, Syriac, Aramaic, Arabic, and in other languages have been consulted. An attempt has been made to carry study of the uses of the materia medica through the entire Arabic period in as great a diversity of texts as possible. To determine the original language or location where a simple was used, checks other than linguistic have also been used. These include the indigenousness of the botanicals in ancient and modern times, the number of species in various possible geographic areas, archeological remains of plants and their representations, fossils, ancient and present day agriculture, modern uses and occurrence in the Near East, Asia, and North Africa, and the names presently in use in India, Persia, Iraq, Egypt, and North Africa, both in the professions and in the bazaars. The materia medica and botany of ancient Babylonia has been considered worthy of study in an extensive manner.

Fortunately, to aid in linguistic work, there is a considerable body of mediaeval manuscript materials concerned with Arabic botanonymy. Some of these works should be mentioned. A remarkable text by al-Bīrūnī, *Kitāb al-Ṣaidana*, gives the synonyms of drugs in Syriac, Persian, Greek, Baluchi, Afghan, Sindi, and other Indian dialects and languages. Maimonides, who was much interested in language, wrote a book giving a listing of important drugs of his time including their synonyms in Syriac, Sanskrit and Indian dialects, Persian, Arabic, Hebrew, Berber, and Old Spanish. An important text because of its North African origin and therefore Berber synonyms is the *Tuḥfat al-aḥbāb fī māhīat al-nabāt wa'l-ᶜasbāb*, "A precious gift to friends concerning the attributes of plants and simples." It is arranged alphabetically, giving 462 entries.[13]

A text of the tenth century in Persia by abū Manṣūr (fl. 961–976) gives the alphabetically arranged simples in Persian, Syriac, Sanskrit, Greek and Arabic.[14] Another text, well known because it is still used as a pharmacological authority today in Egypt, is that by al-Kūhīn b. al-ᶜAṭṭār (1295), *Minhaj al-dukkān*.[15]

The names of the materia medica in al-Kindī have been studied etymologically. The results show that 33% of the names came originally from ancient Mesopotamia. This was usually through the Syriac, Aramaic, Hebrew, Persian, and other intermediaries. About 23% came from Greek sources, 18% from Persian, 13% from Indian, 5% from Arabic, and 3% from ancient Egyptian sources. The remainder is unknown or too small to consider. The Persian and Indian should be lumped together since many of the Persian materia medica may be considered more properly Indian, and also because of the very close relations between these two areas. In that case, the Persian-Indian and Babylonian nomenclatural contributions are about equal. The Greek contribution is third.

Some of the linguistic results are given below very briefly. In this simple case the data shown are considered to be sufficient to determine the origin of the words.

Arabic *wajj*·*Acorus Calamus* L. Sweet-flag.
Sumerian *GI·DŪG*
Akkadian *qanū ṭābu*
Greek *ἄκορον, ἀσπλήνιον*
↓
Modern Arabic *aikar, ighir, ikkur*
↓
Turkish *egur*
Hieroglyphic Egyptian *kš*
↓
Coptic *kas*
Sanskrit *vucha* or *vacā*
↓
Guzerat *vaz*
Deccan *bache*
Malabar *vazabu*
Concan *vaicam*
Hindi *gora vach*
↓
Persian *vāj*
↓
Arabic *wajj*
The sweet-flag is from China, Japan, and India

The etymological results are not always correlative with the uses of the drugs. This indicates a weeding out process on the part of the Arabs who were ready to accept the best from

any culture. The derivations given above are of common plants. In the case of many lesser known plants, which are less ubiquitous, the etymologies are generally more certain and reliable.

Pharmacological Theory

A third line of investigation undertaken by the author is concerned with the development of chemical and pharmacological theory among the Muslims. The particulate theory in chemistry has been discussed elsewhere with its implications for the contemporary medicine.[16] Another point of interest is that of the four humors in Arabic times. An excellent description of pharmacology, coming from the first part of the thirteenth century, is due to al-Samarqandī. He did not compound drugs according to the four degrees of the natures but varied the amount to obtain the exact remedy required. Each disease, every person, and each drug was considered carefully in a particular case. Then the amounts were determined after the qualitative factors, i. e. which drugs were to be employed, were known.

Al-Samarqandī worked out in detail the reasons which determined the exact amounts of drugs to be used.

"As to the reasons for the differences in weight, there are seven simple ones, and compound reasons of these simple ones. As to the seven simple ones, the first is the strength and weakness in its [the drug's] attributes. Second is the abundance or lack of its usefulness. Third is the nobility or lowliness of its benefits. Fourth is its partnership or in its being alone. Fifth is concerned with the location of the ailing organ in regard to its proximity to or distance from the stomach. Sixth is the existence or non-existence of drugs in the compounded one which weaken its strength. Seventh is the existence of harmfulness in it for some organs or for the inadequacy of drugs or their sufficiency."

Al-Samarqandī explained these points at length. He also advocated that a remedy be compounded from the fewest drugs possible. The method of analogy was recommended in medical practice even though it was very difficult to employ. Further, al-Samarqandī gave fourteen reasons for the use of compounded drugs. All these reasons were worked out in a very objective fashion. He was almost unconcerned with the four humors but stressed instead the healing "power" of the drug and its effectiveness when it was compounded with other simples. Al-Samarqandī also gave emphasis to the value of the addition of correctives to ameliorate or balance the powers of some drugs so as not to affect the patient by over strengths of drugs in particular cases.

General Remarks

It is to the credit of the Muslims that they displayed a passion for extending the limits of knowledge both qualitatively and quantitatively. Their work shows a constant progressive evolution in pharmacology, in its theory, the number of simples known, and in the study of pharmacology of other cultures. The Muslims cooperated fully in transferring their science to the Latin West. Due mainly to the Arabs, the questioning intellect was reborn in Europe. The diffusion of Arabic learning and knowledge in Europe primarily through Sicily and Spain permitted a long dormant and rotting society to pull itself together with a headstart to make its own contributions to the further development of medicine and science.

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8. L. Leclerc: *Traité des Simples par Ibn al-Beïthar*, 3 vols., Paris, 1877–1883.
9. Al-jāmiᶜ fi't-ṭibb fi'l-adwiya al-mufrada. Half of this text is preserved in Bibliotheca Osleriana,

McGill University. The entire text is said to be in a depository in Tripolitania. An abridged version by Bar Hebraeus (thirteenth century) was translated by M. Meyerhof and G. Sobhy. *The* Abridged Version of "The Book of Simple Drugs," Cairo, 1932–1940.

10. Citron, *Citrus medica* Risso. var. *Limonum*. *Cf.* Meyerhof and Sobhy, *op. cit.*, pp. 78–79.
11. Leiden 1339 and Rabat 481 used by the author. *Cf.* H. P. J. Renaud. *Bull. soc. franc. hist. méd.*, **21:** 345 (1927); *Hespéris*, **10:** 135–150 (1930–1931).
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13. H. P. J. Renaud, and G. S. Colin, eds., Paris 1934. This work is at least 300 years old. It may have been the glossary of a larger general treatise on medicine. The author is unknown.
14. A. Achundow, ed.: *Kitāb al-abniya ʿan haqāʾiq al adwiya*, "Book on the basis of the properties of drugs," Halle, 1893.
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Extinct Medical Schools of Nineteenth Century Philadelphia: (II) The Philadelphia College of Medicine

By HAROLD J. ABRAHAMS, PH.D.

IN THE first article of this series it was pointed out that the Medical Department of Pennsylvania College and the Philadelphia College of Medicine agreed, in 1858, to study their respective prospects for the future, and within the coming years merge the two schools under the management of the one which held forth the brighter promise of viability. The merger did take place in 1859, the Medical Department of Pennsylvania College transmitting its name and the Philadelphia College of Medicine its faculty. It has also been noted that, within two years after the merger, financial difficulties of the resulting institution led to failure to honor tax bills, and the resignation of a dispirited faculty brought about an end to the combined schools in 1861.

We now turn back for a view of the second party to this merger, the Philadelphia College of Medicine. Dr. James McClintock, a graduate of Jefferson Medical College and student of Dr. George McClellan (founder of the first party to the merger), had established a private school of anatomy, known as "The Philadelphia School of Anatomy", which he had been successfully conducting since 1838, with evident organizational and promotional skill. McClintock was noted for his brilliant demonstrations on anatomy. Styled an "irregular" in his own city, he was nonetheless held in high repute elsewhere, having been called to the chair of anatomy and physiology at the Castleton Medical College in Vermont (1841), where he was elected president. He left this school in 1842 to become professor of anatomy and physiology at the Berkshire Medical Institution in Massachusetts. In 1843 he returned to Philadelphia and his earlier educational activities, in which Drs. J. H. McCloskey and Jackson Van Stavern joined him as lecturers on practice and materia medica, respectively.

In 1847 Dr. McClintock obtained from the Pennsylvania Legislature a charter for The Philadelphia College of Medicine[1] which he had organized in 1846 and which was to hold both a winter and a summer session. This institution had the power to confer the degree of Doctor of Medicine at the close of each session. The other Philadelphia schools of medicine refused to accept students *ad eundem* from Dr. McClintock's school, because of the two-session plan, whereupon he obtained redress from the Legislature, which passed a bill compelling the recognition of his school on terms of equality with other institutions. Thus Dr. McClintock's Philadelphia School of Anatomy evolved into, and became one with the Philadelphia College of Medicine, which was destined to flourish, independently, until 1859, when it fused, then disappeared.[2]

[1] A pamphlet in possession of the Library of the College of Physicians of Philadelphia bears the title, "Constitution and By-Laws of the Medical College of Philadelphia, 1836". This was an educational-professional society and "was conceived as a sort of American College of Physicians, to examine and register teachers," and to educate for the degree of M.D.; but it never functioned. (See William F. Norwood: *Medical Education in the United States before the Civil War*, Philadelphia, University of Pennsylvania Press, 1944, p. 106.) It should not be confounded with the Philadelphia College of Medicine.

[2] In 1852 the famous D. Hayes Agnew revived the Philadelphia School of Anatomy, and, under him, it enjoyed a remarkable success for ten years. It became known as the Philadelphia Polyclinic and College for Graduates in Medicine, (ibid, p. 103) later in the century, after teaching by several proprietors who succeeded Dr. Agnew.

I. BUILDING AND EQUIPMENT

The first classes were held in the edifice used by the Philadelphia School of Anatomy, and in that of the "school of pharmacy on Filbert St., above Seventh" (The Philadelphia College of Pharmacy). In Autumn, 1847, classes moved to a building on Fifth St., south of Walnut. From this fledgling school four hundred students were graduated in the first seven years.

The building at Fifth and Walnut Streets had been "built with the design of accommodating the Supreme Court of the State of Pennsylvania". It was five stories high, stucco-covered, and had marble cornices and lintels. There were two well-appointed lecture rooms, one, the anatomical theatre, having a handsome dome. There was a museum at the front of the building, above which there were rooms for the professors, and classrooms. The spacious dissecting room was well-lighted from the roof and sides. It was well-ventilated, conveniently furnished and abundantly supplied with dissecting material. Gas and water were supplied throughout the building. Located only about 100 yards from Independence Hall, it was also close to the Philadelphia Dispensary, the American Philosophical Society Library, and about 400 yards from the Pennsylvania Hospital. Nearby Washington Square was an agreeable resort during the summer term. The College claimed that there was no more suitable building for medical instruction in our country.

The extensive anatomical museum was an excellent one and continued to enjoy a steady growth. The college was equipped with scientific apparatus, plates, drawings, enlarged wax, leather and papier maché models, all kinds of specimens, wet and dry surgical preparations, medicinals, pharmaceutical preparations, pictures, diagrams, surgical appliances, manikins, and equipment for the study of medical chemistry ("recent means of chemical diagnosis of diseases of urinary and digestive apparatus and in infections of the blood"). A department of pharmacy provided advanced students with an opportunity to learn how to compound medicines for patients. There was a large, well-lighted reading room, open day and evening, where students could study between lectures. Everything was done to enhance the health, comfort, and interest of students.

Facilities available to students included the Pennsylvania Hospital and Library, The Wills Hospital, The Philadelphia Dispensary and other dispensaries, obstetrical facilities, and a number of internships or resident studentships in the various medical charities of the city which offered "facilities in this respect . . . altogether superior to anything on this Continent."

II. CURRICULUM

A salient feature of the curriculum of this medical school was the provision which it made for two terms of instruction per year, thus enabling a student to reduce, by one year, the length of time spent by students at other schools of medicine in the city. Thus a person could enter the practice of medicine one year earlier than graduates of other schools. This made the college popular among persons wishing to be trained quickly and still meet the general requirements for graduation in force elsewhere. This two-term plan was, however, abandoned eventually after the reorganization of the faculty and the adoption, by the college, of the Code of the American Medical Association.[3]

[3] The Announcement for the Collegiate Year 1854–55 laid emphasis upon the College's adoption of the principles of the American Medical Association and its own desire to participate in reform in medical education. "In proof of their sincerity on this point, they are prepared to recommend the establishment of an annual Board of Examiners, to consist of gentlemen not connected with the Colleges whose students are offered for graduation. The Faculty of the Philadelphia Medical College will, at any period, unite with those of the other Colleges of this city in establishing this desirable reform—the principle being that the true test of fitness for a medical degree is merit and acquirement. All other requisites and conditions of graduates should be subordinate to these. It is an error to suppose that by prescribing a certain limit to the time of attendance upon lectures we can adjudge with certainty the merits of students. Experience has convinced the faculty of the impropriety of fixing rules of time which will be

The educational philosophy of the planners was based on the belief that a four-months term was not of sufficient length to satisfy the standards of the faculty, nor to meet the requirements of the profession. The fall term, or course, was therefore followed by a spring term, beginning in early March, and continuing for four months. By this arrangement a student could have a second complete course, without the cost and loss of time involved (for out of town students) in returning home, and without the additional payment of tuition for another college year. A number of points made up the argument for a two-term year: Students who heretofore were impelled to study at "country schools" could now have all the advantages of study in a city which was recognized as the medical center of the United States. No other city could provide the advantages in anatomy, surgery, obstetrics and clinics available here in the Spring. Students from the South who might suffer derangements of health by the weather of northern winters would be better off by studying in this city in the springtime, and have the additional advantage of the greater availability of places and things, (in anatomy, obstetrics, clinics), due to the fact that there were few students in the city at that season of the year. A third advantage was that some subjects could be covered by fewer lectures than others, and such courses would end ahead of the others, or be repeated and grow tiresome, but by going over the entire course carefully and completely a second time, registration upon the mind would be improved, ambiguous points cleared up, and more learning retained. European schools were not teaching greater content in medicine and surgery, but the courses in them were arranged in a plan similar to this one.

Following the thought of the London schools of medicine, the Philadelphia College of Medicine recommended the European curriculum of studies, as follows:

First Course: anatomy, chemistry, materia medica, midwifery, dissections.

Second Course: anatomy, materia medica, physiology, obstetrics, therapeutics, toxicology, practical chemistry.

Third Course: surgery, dissecting, theory and practice of medicine, chemistry, hospital attendance, and clinical instruction.

Fourth Course: surgery, practice of medicine, materia medica, anatomy, physiology, pathology, diseases of women and children, hospital attendance.

The claim was made that at this school three-fourths of the students attended three courses, and that the amount of instruction given equalled that embraced in the plans of the "Schools of Physic in Ireland and the School of Medicine in Paris."

There were five or six lectures daily, except for Wednesdays and Saturdays, these mornings being devoted to attendance at hospitals and the college clinic where patients were "exhibited, operations publicly performed, and lectures delivered."[4]

incapable of exception. Time does not always accurately measure capacity, labor or acquisition of knowledge. If the instruction of students in the offices of their private preceptors were more thorough (as has been suggested in some of the Reports to the National Association) the labor of Professors would be lighter, and the qualification of graduation more complete.

The Faculty has resolved to assimilate in one respect to the universal custom of non-medical Collegiate Institutions;—by affording an opportunity to such students as may desire it, after the termination of their first course, to undergo an examination, upon the fundamental branches of study, to decide whether they may be admitted as "senior students"; becoming candidates for graduation at the end of their second session. . . . By the proposition already made, to unite with other Institutions in placing the examining power with an impartial Board outside the Colleges;—it is shown that it is the wish, and will be the endeavor of the Faculty, to fit competent men for the practice of medicine and to encourage or graduate none who are incompetent."

[4] Full lectures were given upon the following branches: Anatomy, Chemistry, Clinical Medicine and Surgery, Diseases of Women and Children, Materia Medica, Medical Jurisprudence, Midwifery, Pathology, Pharmacy, Physiology, Theory and Practice of Medicine, Surgery, Therapeutics. (The chair in Institutes was replaced in 1852 by one in Histology, in order that theoretical lectures should to some extent be replaced by direct contact of the student with the materials which he was studying. Institutes was however restored

At each lecture a professor recapitulated earlier lectures, after which those students, who wished to be, were subjected to examination on the previous lecture.

The Announcement of the Philadelphia College of Medicine for 1857, while maintaining that the two-term system left it with no regrets, states that the plan has proved "excessively laborious" and has resulted in time lost (on repetition) which could have been spent with greater profit, on special topics of practical importance. The second course would, from now on, be modified and cease to be a graduating session, leaving only one such session per year.

The modified ("summer") session would consist of three daily lectures for 12 weeks, beginning in April:

1. application of the microscope to physiology, pathology and diagnosis
2. practical pharmacy
3. surgery of the eye, ear and urinary organs
4. diseases of children
5. general pathology, semeiology and therapeutics
6. general and organic chemistry
7. surgical anatomy
8. medical jurisprudence and toxicology.

The college placed emphasis upon formation of good character in its students and development of reasoning powers, rather than reliance upon memory alone. The *Announcement for 1856* tells us that prizes, given one year, had to be abandoned, out of fear that "too exciting an emulation might be aroused."

Requirements for graduation:

1. At least 21 years of age, and spent three or more years acquiring a knowledge of medicine.

2. Two or more years of study as a pupil of a regular and reputable physician.

3. Two full courses of lectures, (see text above), one of which could be in some other recognized college of medicine.

4. Thesis upon some medical subject.

5. Letter of recommendation from the preceptor.

(In 1854 the number of years spent with a preceptor was raised to at least three, and one course in "hospital practice" in Philadelphia or elsewhere was stipulated.)

6. Pass an examination before the Faculty.

These requirements were virtually identical with those for graduation from the Medical Department of Pennsylvania College.

III(A). FACULTY

Session of 1847–1848

Rev. J. P. Durbin, D.D. President

James McClintock, M.D. Dean, Professor of General, Special and Surgical Anatomy, and of Principles and Practice of Surgery

Jesse R. Burden, M.D. Professor of Materia Medica and Therapeutics

D. Pereira Gardner, M.D. Professor of Chemistry and Medical Jurisprudence

Henry Gibbons, M.D. Professor of Institutes and Practice of Medicine

Louis H. Beatty, M.D. Professor of Obstetrics and Diseases of Women and Children

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within a short time.) Lectures were copiously illustrated by use of the many resources listed under, "2. Building and Equipment."

In 1858 an obstetrical clinic, "a new idea in medical schools", was introduced into the curriculum. In the same year physical diagnosis and topographical anatomy replaced surgical anatomy in the summer supplementary course.

A typical roster (1851) was as follows:

Hour	Monday	Tuesday	Wednesday
10 A.M.	Mat. Med.	Mat. Med.	Hospital
11 A.M.	Obstetrics	Obstetrics	Hospital
12 A.M.	Practice	Practice	Practice
1 P.M.	Anatomy	Anatomy	Anatomy
4 P.M.	Surgery	Surgery	Surgery
5 P.M.	Chemistry	Chemistry	Institutes

Hour	Thursday	Friday	Saturday
10 A.M.	Mat. Med.	Mat. Med.	Hospital
11 A.M.	Institutes	Obstetrics	Hospital
12 A.M.	Practice	Practice	Clinic
1 P.M.	Anatomy	Anatomy	Clinic
4 P.M.	Surgery	Surgery	—
5 P.M.	Chemistry	Chemistry	Institutes

On the basis of a session of about eighteen weeks duration, the time given to each subject was almost the same as that at the Medical Department of Pennsylvania College.

S. R. McClintock, M.D. Demonstrator of Anatomy
D. J. McKibbin, M.D. Prosector of Surgery.

Session of 1848–49

James McClintock, M.D. Professor of Anatomy and of Surgery
S. R. McClintock, M.D. Adjunct Professor of Anatomy
Jesse R. Burden, M.D. Professor of Materia Medica and Therapeutics
Henry Gibbons, M.D. Professor of Institutes of Medicine and Medical Jurisprudence
Charles A. Savory, M.D. Professor of Midwifery and Diseases of Women and Children
A. L. Kennedy, M.D. Professor of Chemistry
M. W. Dickeson, M.D. Comparative and Pathological Anatomy
Professor of Theory and Practice of Medicine (Name of incumbent not given)
Richard Burr, M.D. Prosector of Surgery.

Session of 1849–50 and of Spring 1851

Hon. Jesse R. Burden, M.D. President
James McClintock, M.D. Dean, Professor of Principles and Practice of Surgery, and of General, Special and Surgical Anatomy
Rush Van Dyke, M.D. Professor of Materia Medica and General Therapeutics
Thomas D. Mitchell, M.D. Professor of Theory and Practice of Medicine
James Bryan, M.D. Professor of Institutes of Medicine and Medical Jurisprudence
Ezra S. Carr, M.D. Professor of Medical Chemistry
Frederick A. Fickardt, M.D.[5] Professor of Obstetrics and Diseases of Women and Children
George Hewston, M.D.[5] Demonstrator of Anatomy.

[5] Another edition of the *Announcement for 1849–50* lists Christopher C. Cox, M.D., as Professor of Midwifery and Diseases of Women and Children, M. W. Dickeson, M.D., Professor of Comparative and Pathological Anatomy, N. Richards Moseley, M.D., Demonstrator of Anatomy, and Richard Burr, M.D., Prosector of Surgery.

Session of 1852–53

Hon. Jesse R. Burden, M.D. President
James McClintock, M.D. Dean, Professor of Anatomy
Rush Van Dyke, M.D. Professor of Medicine
James Bryan, M.D. Professor of Surgery
Ezra S. Carr, M.D. Professor of Chemistry
Frederick A. Fickardt, M.D. Professor of Materia Medica
Henry Geiger, M.D. Professor of Midwifery[6]
Henry Goadby, M.D., F.L.S. Professor of Histology
David Paul Brown, Esq., Professor of Forensic Medicine
George Hewston, M.D. Demonstrator of Anatomy.

Session of Spring 1854

Hon. Jesse R. Burden, M.D. President
Frederick S. Giger, M.D. Dean, Professor of Surgery
Henry Geiger, M.D. Professor of Midwifery
George Hewston, M.D. Professor of Anatomy
Isaac A. Pennypacker, M.D. Professor of Theory and Practice of Medicine
James L. Tyson, M.D. Professor of Materia Medica and Therapeutics
Henry Hartshorne, M.D. Professor of Institutes of Medicine
B. Howard Rand, M.D. Professor of Chemistry
William Taylor, M.D. Prosector of Anatomy
William Brisbane, Prosector of Surgery.

Session of 1854–55

Hon. (Chief Justice) Ellis Lewis, M.D., LL.D. President
George Hewston, M.D. Professor of Anatomy
B. Howard Rand, M.D. Dean, Professor of Chemistry
Henry Hartshorne, M.D. Professor of Institutes of Medicine
Isaac Pennypacker, M.D. Professor of Theory and Practice of Medicine

[6] John K. Mason, M.D. was originally announced as incumbent, but in the copy of the *Announcement* used, his name has been deleted and Dr. Geiger's name written in.

James L. Tyson, M.D. Professor of Materia Medica and General Therapeutics
Joseph Parrish, M.D. Professor of Obstetrics and Diseases of Women and Children
Edward M. Tilden, M.D. Professor of Surgery
Theodore Castle, M.D. Demonstrator of Anatomy

Session of 1855–56

Same as Session of 1854–55, with the following changes:

James Bryan, M.D. Professor of Principles and Practice of Surgery, replacing Dr. Tilden.
Lewis D. Harlow, M.D. Professor of Obstetrics and Diseases of Women and Children, replacing Dr. Parrish, who became emeritus professor.
William H. Freeman, M.D. Demonstrator of Anatomy, replacing Dr. Castle.

Session of 1856–57

Same as for Session of 1854–55, with the following changes:

Alfred T. King, M.D. Professor of Theory and Practice of Medicine, replacing Dr. Pennypacker.
George Dock, M.D. Professor of the Principles and Practice of Surgery, replacing Dr. Tilden.
Lewis D. Harlow replaced Dr. Parrish in Obstetrics (1855)
William Bradley, M.D. Demonstrator of Anatomy
William H. Hazzard, M.D. Prosector of Surgery, replacing William Brisbane.

Sessions of 1857 and 1858

Hon. (Chief Justice) Ellis Lewis, M.D., LL.D. President.
William H. Gobrecht, M.D. Professor of Anatomy
B. Howard Rand, M.D. Dean, Professor Medical Chemistry
Henry Hartshorne, M.D. Professor of Theory and Practice of Medicine
Lewis D. Harlow, M.D. Professor of Obstetrics and Diseases of Women and Children
William S. Halsey, M.D. Professor of Principles and Practice of Surgery
William H. Taggart, M.D. Professor of Materia Medica and Therapeutics
James Aitken Meigs, M.D. Professor of Institutes of Medicine
William Bradley, M.D. Demonstrator of Anatomy
William H. Hazzard, M.D. Prosector of Surgery.

III(B). ALPHABETIZED LIST OF MEMBERS OF THE FACULTY[7]

(For Faculty grouped by year see previous pages)

Beatty, Louis, M.D. 1847
Bradley, William, M.D. 1856–58
Brisbane, William 1854
Brown, David Paul[8] 1852
Bryan, James, M.D. 1849–55
Burden, Jesse R., M.D. 1847–48 (President 1849–1854)
Burr, Richard, M.D. 1848–49
Carr, Ezra S., M.D. 1849–52
Castle, Theodore, M.D. 1854
Cox, Christopher C., M.D. 1849
Dickeson, M. W., M.D. 1848–49
Dock, George, M.D. 1856
Fickardt, Frederick A., M.D. 1849–52
Freeman, William H., M.D. 1855
Gardner, D. Pereira, M.D. 1847
Geiger, Henry, M.D. 1852–54
Gibbons, Henry, M.D. 1848
Giger, Frederick, M.D. 1854
Goadby, Henry, M.D. 1852

[7] The initial and final dates do not necessarily imply continuous service.

[8] David Paul Brown attained high distinction as a lawyer, orator, and dramatist. He began studies as a medical student under Benjamin Rush. Upon Dr. Rush's death, Brown turned to a career in law. His high oratorical repute led to his being selected to deliver the address of welcome to Lafayette in 1824. He wrote book-reviews, poems, and plays, in one of which, "Sertorius", Junius Brutus Booth played the title rôle, in Philadelphia, in 1830 and 1832, and later made a part of his repertoire. Because of his skill at cross-examination he was retained in almost every important criminal case in the Philadelphia courts of his time.

Gobrecht, William H., M.D. 1857–58
Halsey, William S., M.D. 1857–58
Harlow, Lewis D., M.D. 1855–58
Hartshorne, Henry, M.D.[9] 1854–58
Hazzard, William H., M.D. 1856–58
Hewston, George, M.D. 1849–56
Kennedy, A. L., M.D.[10] 1848
King, Alfred T., M.D. 1856
McClintock, James, M.D. 1847–52
McClintock, S. R., M.D. 1847–48
McKibbin, D. J., M.D. 1847
Meigs, James Aitken, M.D.[11] 1857–58
Mitchell, Thomas D., M.D.[12] 1849
Moseley, N. Richards, M.D. 1849
Parrish, Joseph, M.D. 1854
Pennypacker, Isaac, M.D. 1854–55
Rand, B. Howard, M.D. 1854–58
Savory, Charles A., M.D. 1848
Taggart, William H., M.D. 1857–58
Taylor, William, M.D. 1854
Tilden, Edward M., M.D. 1854
Tyson, James L., M.D. 1854–56
Van Dyke, Rush, M.D. 1849–52

IV. TEXTBOOKS USED

Anatomy

Horner, Pancoast's Wistar, Goddard's Wilson (1847), Cruveillier, Morton, Quain, Dublin Dissector (1856), Agnew (1857), Wilson's Dissector (1856), Allens' Dissector's Guide (1858).

Chemistry

Draper (1847), Fownes, Turner, Kane (1848), Graham (1847–48), Rand (1858), Lehman (1858).

Diseases of Women and Children

Condie, Dewees, Churchill, Columbat, Stewart, Eberle and Mitchell, Meigs (1856), Billard (1856), Bennett (1858), West (1858).

Materia Medica

Pereira, Royle, Eberle (1847–48), Dunglison (1847–48), Thompson's Conspectus, Christison

[9] Henry Hartshorne was one of the founders of the American Public Health Association in 1872. He contributed papers to the publications of The American Philosophical Society, particularly upon the subject of physics, and was a member of the Society. He was a prolific writer, publishing a few volumes of poetry, a novel, (*Woman's Witchcraft*,—under the pseudonym, "Corrine L'Estrange"), and certain medical works, among which were: *Essentials of the Principles and Practice of Medicine* (1867), and *A Conspectus of the Medical Sciences* (1869), both subsequently translated into Japanese. He also edited a religious journal, *The Friends' Review*, was a staunch advocate of the right of women to study medicine, and worked on behalf of the prevention of traffic in opium.

[10] Alfred L. Kennedy was a contributor to the development of education in science and technology. He organized the Philadelphia School of Chemistry (1842), and was the prime-mover in the organization (1853) of the Polytechnic College of Pennsylvania, which he served as president and teacher of chemistry, mineralogy and geology. This college consisted of five technical divisions: schools of mines, practical chemistry, civil engineering, mechanical engineering and architecture. Dr. Kennedy's school had a great impact upon public opinion in favor of technical education. Thus his pioneering led to the establishing of technical schools not only in Pennsylvania but also in many other states. See J. P. Wickersham: *A History of Education in Pennsylvania*, Lancaster, Pa. (1886); also James G. McGivern: *Polytechnic College of Pennsylvania,—The Forgotten College*, Journal of Engineering Education, **52:** 106 (1961).

[11] James Aitken Meigs was a noted obstetrician, teacher, author, and anthropologist. His contributions to anthropology include the *Catalogue of Human Crania in the Collection of the Academy of Natural Sciences of Philadelphia*, (a 103 page special supplement in the Proceedings for 1856), and *The Cranial Characteristics of the Races of Man*, in *Indigenous Races of the Earth*, by Nott and Glidden (1856). He edited the American edition of W. S. Kirke's *Manual of Physiology* (1857). Dr. Meigs contributed articles to *The Medical Examiner* and *The American Journal of the Medical Sciences*. He was especially successful in physiological demonstrations, and in lectures on the eye and ear, at Jefferson Medical College, the faculty of which he joined in 1868.

[12] Thomas D. Mitchell's works include: *Medical Chemistry, or a Compendious View of the Various Substances Employed in the Practice of Medicine, Elements of Chemical Philosophy*, (a large work), *Hints on the Connexion of Labor with Study as a Preventive of Diseases Peculiar to a Student, Materia Medica and Therapeutics*, and *Fevers of the United States* (an unpublished work). He also edited John Eberle's: *A Treatise on the Diseases and Physical Education of Children*. He contributed to the medical journals, his first papers appearing while he was yet a student. He also taught chemistry in The Medical Institute of Louisville, Ky., at Miami University, at The Medical College of Ohio, and elsewhere.

(1848), Griffith's Formulary, Wood and Bache (1856) U. S. Dispensatory (1858).

Medical Dictionary

Gardner's edition of Hooper.

Medical Jurisprudence

Guy, Ryan, Taylor, Beck.

Midwifery

Velpeau, Lee, Rigby, Meigs, Chailly, Dewees (from 1849 on), Cazeau, Simpson (1856), Ramsbotham (1856), Churchill (1856), Miller (1858).

Pathology

Williams

Physiology

Carpenter, Muller, Dunglison (1847), Magendie (1847–48), Sweetser (1851), Williams (1856), Kirkes and Paget, Peaslee (1858).

Surgery

Druitt, Miller, Gibson, Cooper, Liston, Velpeau, McClellan, (from 1849 on), Skey (1856), Ferguson, Chelius (1856).

Theory and Practice of Medicine

Watson's Lectures by Condie, Wood's Practice (1847), McIntosh by Morton (1847), Bell's Stokes, Dickson (1856), Williams (1858).

V. LIST OF MATRICULATES AND GRADUATES OF THE PHILADELPHIA COLLEGE OF MEDICINE

The letters "M.D." indicate that the degree of Doctor of Medicine was conferred by the Philadelphia College of Medicine in the year stated immediately following the degree. If, however, "M.D." is enclosed in parentheses, i.e. "(M.D.)," neither the date nor the school which conferred the degree is evident from the College records alone. The absence of M.D. after a name means that available records show only that the person named was a matriculate in the year or years given. There were two entering classes (March and November) and two commencements (March and July) per year. This list makes no distinction in the session. For example, for a matriculate or a graduate, '50 would mean either March, July, or November, 1850. In some cases it is impossible to determine the date of graduation more precisely than that it took place in one of the years between 1853 and 1855 inclusive. Such names are marked with an asterisk. Any years stated after the first date following the "M.D." mean that the holder of the degree spent that time in the school subsequent to the conferring of the degree, presumably as a post-graduate. Parentheses around a letter indicates that existing records show variant spellings, and the possibility that two different persons might be involved cannot be ruled out with certainty.

Examples:

1. Doe, John, '50—Matriculate, College year 1850–1851, or Spring '50.
2. Doe, John, '50, '51—Matriculate, years 1850–1851 and 1851–1852, or Spring '50 and Spring '51.
3. Doe, John, M.D. '51—Degree conferred by the Philadelphia College of Medicine in 1851.
4. Doe, John, (M.D.) '51—Did post-graduate work at Philadelphia College of Medicine in college year 1851–1852, but year and college which conferred M.D. degree are not on record.
5. Doe, John, M.D., '51, '52, '53—M.D. degree conferred by the Philadelphia College of Medicine in 1851. Did post-graduate work there in years 1852–1853 and 1853–1854.
6. Doe, John '55 (M.D.) '58—Matriculate in 1855, source of M.D. degree unknown, and returned to the Philadelphia College of Medicine for post-graduate work in 1858.

Honorary degrees are so indicated. Holders of the M.D. degree who were "*ad eundem*" are also so symbolized.

Most of the documents from which the data

for this list are drawn have been assembled by the Library of the College of Physicians of Philadelphia. The National Library of Medicine (in Bethesda, Md.), the libraries of the Historical Society of Pennsylvania (in Philadelphia), the Commonwealth of Pennsylvania (in Harrisburg), the New York Academy of Medicine, the Library Company of Philadelphia, and the Boston Medical Library also have holdings pertaining to this medical school.

It has, to date, not been possible to locate names of matriculates for the following years:

November—'48, '51, '52 (in part), '53, '54, '58

March—'52, '53, '54, '55, '58, '59, nor for graduates for:

July '55, July '57, July '58,

March '59.

Abercrombie, James B., '50
Adams, J. William, M.D., '56
Adams, Thomas J., '57, '58
Alday, John H., M.D., '49, '49, '50
Alexander, H. K., M.D., '52
Allen, William H., (M.D.), '48, *ad eundem*
Anderson, Joseph W., (M.D.), '55, '56
Andrews, William P., M.D., '50
Andrews, Richard S. R., '49, '50
Angney, John R., M.D., '50, '55, '56
Archer, Anson S., M.D., '58
Armstrong, Thomas M., '57, '57, '58
Asay, Abram Merritt, '49, '50, '50, '57
Asay, J. Lambert, '55, '56
Ash, Henry St. Clair, M.D., '50, '50
Ashton, D. R., '55, '56, '56, '57, '57
Austin, John, M.D., '51
Averett, Thomas H., (M.D.), Honorary M.D., '50
Avery, Samuel (M.D.), '50

Bachman, Gabriel, M.D., '58
Bacot, S. W., '51
Baguley, Dave, M.D., '51
Bailey, Edward H. C., (M.D.), '57, *ad eundem*
Baird, Spencer F., Prof., M.D., Honorary M.D., '48
Baker, Edward L., (M.D.), '52, *ad eundem*
Baker, James E., M.D., '49
Bartt, A. M., (M.D.), '51, *ad eundem*
Bason, William F., M.D., '52
Baxter, O. F., (M.D.), '47, '48
Beasley, John F., M.D., '52
Bell, Benjamin W., M.D., '56
Bell, James B., M.D., '51
Bell, Thomas, '51
Bennet, L., '51
Bennett, John C., (M.D.), Honorary M.D., '53
Benny, Samuel P., M.D., '49
Berg, Joe F. D. D., M.D., '49
Best, David, M.D., '50
Betton, Tom Forrest, (M.D.), '56, *ad eundem*
Beyerle, Henry J., M.D., '51
Birkey, W. J. A. Jr., M.D., '49, '55, '56
Bishop, William S., (M.D.), '47, '48
Bishop, William, '57, '58
Bitner, Henry Hoffman, M.D., '50
Black, Jas. C., '50
Black, Kenneth A., M.D., '52
Black, William P., M.D., '47
Bley, George Jr., M.D., '50, '50
Bley, John, '49, '50, '50
Bloede, Gustavus, '51
Blount, Joseph E., M.D., '54
Bobbs, John S., (M.D.), '49, Honorary
Bocock, Charles T., M.D., '51
Booth, George W., M.D., '50
Boozer, Adam P., M.D., '56
Borden, Henry M., '49, '49, '50
Borgin, John H., '55, '56
Bostick, Thaddeus M., M.D., '56, '56, '57, '57, '58
Boughner, James V. (E)., Honorary M.D., '47
Bowdoin, William I. (J)., M.D., '49
Bowen, Horace, '52
Bowes, Robert L., M.D., '52
Bradley, Michael, M.D., '57, '57, '58
Bradley, William, M.D., '56, '56
Breesee, Jacob R., '49, '49, '50, '50
Brewer, Paul, M.D., '49
Brewster, Thomas S., M.D., '52
Brisbane, William, M.D., '54
Brooker, Benjamin C., '49, '49, '50
Brookings, Charles H., '55, '56
Brown, Aaron P., M.D., '56
Brown, Alex, M.D., M.R.C.S., Honorary M.D., '51
Brown, B. B., (M.D.), '48, *ad eundem*
Brown, Chas. D., M.D., '55
Brown, James B., M.D., '56
Brown, John, M.D., '53, '55, '56
Brown, John Lewis, M.D., '53
Brown, J., '49, '50
Brown, William C., M.D., '54
Browne, James S., '47
Broyles, Julius J. F., M.D., '53
Bruen, James, M.D., '56
Bryan, John W., M.D., '51, '55, '56
Bryant, James H., M.D., '49
Buckingham, Thomas L., M.D., '51, '51
Buffington, Benjamin F., M.D., '49, '49, '50
Bunn, Robert S., M.D., '52
Bunting, Thos. C., '50
Burch, William, M.D., '52
Burden, Andrew M., M.D., '51, '51
Burg, George C., M.D., '50
Burgin, John H., M.D., '57, '57, '57, '58

Burnett, Joseph Oliver, M.D., '56, '56, '57, '58
Burr, Richard, (M.D.), '47
Butler, La Fayette, '47
Byrd, H. L., (M.D.), '49, *ad eundem*

Cabé, Rafael, '55, '56, '56, '56, '57, '57
Cabell, Powhattan P., M.D., '53
Cad(e)y, Charles E., M.D., '56, '56, '57, '57, '57, '58
Calhoun, John C., Jr., M.D., '48
Campbell, Andrew P. C., M.D., '53
Campbell, George W., M.D., '53
Campbell, J. A., '51
Campbell, John W., M.D., '50
Campbell, William K., M.D., '50
Carson, R. F., '50
Carter, Elisha V., M.D., '53
Carter, Leonard N., M.D., '52
Carter, Matthew M., M.D., '48
Casals, Jose Leon, M.D., '48
Casals, Joseph Leon, '48
Castle, Joseph, M.D., '48
Castle, Theodore B., M.D., '51
Castro, Louis Martin y de, M.D., '56
Caverly, Abiel M., M.D., '53
Chaffee, C. C., (M.D.), '48, *ad eundem*
Champney, Samuel T., M.D., '52
Chandler, W. G., '56, '57, '57
Chaipin, J. B., '51
Chapin, Wm., '50
Chapman, John W., '47
Chapman, W. Z. W., '47, '47, '48
Chattle, Thomas G., M.D., '54
Cheatham, Arthur T., M.D., '56, '56
Cheek, Stephen H., M.D., '57
Chesbire, Robert S., M.D., '55
Chester, T. K., '52
Chrisman, W. L., (M.D.), '57
Christain, Hope H., M.D., '50
Christain, R., '48
Christian, William, '49
Christie, James G., M.D., '57
Christine, John S., '49
Christy, R. A., '47
Clapp, Fayette, (M.D.), '58, *ad eundem*
Clare, Joseph, Honorary M.D., '56
Clark, John P., M.D., '52
Clark, Michael Roach, M.D., '50
Clark, William W., '49, '50
Clark, M. R., '50
Claybrook, Robert W., M.D., '52
Clearwater, Reuben M., M.D., '54
Coad, Joseph R., '50
Cobb, Maxfield C., M.D., '58
Cochrane, Andrew, M.D., '52
Cole, Cortlen, M.D., '50, '50
Colvin, A. J., '47, '48
Combs, Gilbert, '50
Compton, William, M.D., '53
Cook, Augustus G., M.D., '52
Cook, C. L., (M.D.), '50
Cook(e), George H., M.D., '56, '56, '56, '57
Cooke, Thomas, '49, '50
Cooley, Hiram C., M.D., '53
Cooper, Ralph L., M.D., '58
Cory, A. Mor(r)ell, M.D., '57
Courts, William J., '56
Cowdrey, Arthur H., '57, '58
Cox, Charles (E.) C., M.D., '51, '51
Cox, Thomas J., '50
Cracraft, De Witt C., '50
Cr(a)ycraft, George A., M.D., '52
Cra(o)wley, John B., '57
Crespo, Joseph Alonzo, (M.D.), Honorary M.D., '52,
Crooks, John W., M.D., '51
Crooks, Manning J., '57, '58
Cross, James M., M.D., '53
Crowell, John Jr., (M.D.), '50
Crowley, John B., M.D., '58
Crump, Morris, M.D., '54, '57, '58
Cunningham, James, M.D., '52
Cunningham, A. McNair, M.D., '56
Cunningham, J. F., M.D., '50, '50
Cureton, Thomas K., Jr., M.D., '53
Curray, Charles, '55, '56
Curtis, J. Lackland, M.D., '55, '56
Czapkay, L. J., M.D., '58, *ad eundem*

Dailey, Edward D., M.D., '48
Dailey, Saurin T., M.D., '52
Dalton, Henry Gibbs, M.D., '52
Danowsky, F. A., M.D., '49
Dantzler, Adam M., M.D., '57
Dartt, A. M., (M.D.), '47, *ad eundem* '51
Dean, W. Evans, M.D., '56
De (Le) Blanc, Theodore, M.D., '52
De Hay, Robert B., M.D., '57, '57
Dempsey, E., '50, '51
De Saussure, Allen J., M.D., '50
Deuchar, Edgar, '55, '56, '56, '56, '57, '57
DeWitt, William R., Jr., M.D., '51, '51
Dickerson, Jacob, '55, '56, '56, '56, '57, '57
Dickinson, George, '50
Dickinson, Joseph, '57, '58
Dickson, John, M.D., '51, '51
Dickson, John M., '55, '56, '56, '57
Divine, James, '47, '48
Dobbs, L. D., '47
Dodge, Edward R., M.D., '57
Donaghy, John, M.D., '48
Donnelly, Edward, M.D., '54, '55, '56, '56, '57
Donose, Manu(y)el, M.D., '52
Douglass, Swanson W., M.D., '52
Dow, James E., M.D., '51
Drummonds, Andrew P. (J)., '55, '56, '56, '57

Du Bouchet, Charles A., M.D., '50
Duncan, James L., (M.D.), '55, '56
Duncan, Joseph L., M.D., '55
Dunn, Samuel W., (M.D.), '47, '47, '48
Durham, Joseph D., '56
Durney, M. Angelo, M.D., '49
Dwight, S. J. (S), M.D., '47

Eagens, Henry, '56, '57, '57
Earls, J. W., '49
Eberhart, George, M.D., '54
Eberhart, James G., M.D., '54
Edgerton, Edwin T., M.D., '51
Ellis, Binns J., '48
Emery, George, M.D., '53
Engelhard, Leonard Fred, M.D., '56
Ernst, William S., M.D., '51
Esenwein, Augustus, '50, '51
Esher, Charles, '50
Estephe, Victor, '57, '58
Evans, Britton, M.D., '51, '51
Evans, Louis W., M.D., '49
Evans, William Ashton, M.D., '56, '57
Eversole, Abraham S., M.D., '51

Faber, Samuel, '57, '58
Fennimore, William, M.D., '52
Fenton, Randall, '47, '48
Fetter, Davis F., M.D., '53
Finch, W. W., (M.D.), '47
Fish, Ira W., M.D., '50
Fitch, Leonard M., (M.D.), Honorary M.D., '49
Fithian, Joseph, (M.D.), Honorary M.D., '49
Flanders, A. Hilliard, M.D., '50
Flint, Thomas M., '48
Flowers, Albert, M.D., '51
Folk, Henry W. C., M.D., '51
Folk, William W., M.D., '51
Ford, Chas. B., '51
Fo(r)ster, Andrew, M.D., '50
Foster, Charles B., M.D., '51
Foster, R., (M.D.), '49, '50
Fox, John M., (M.D.), '57, '58
Franciscus, Edmund, '56, '57, '57, '58
Fraser, Joseph Nutting, M.D., '56
Freeman, William H., (M.D.), *ad eundem*, '55
Frees(z)e, Jacob R., M.D., '51, '51
Fuchs, John M., M.D., '55, '55, '56, '56
Funkhouser, D., (M.D.), '49

Ganahl, Joseph, '50
Gary, John R., M.D., '51, '51
Gaskill, Charles D. (T), '49, '49, '50, '50
Gaston, Joseph, (M.D.), Honorary M.D., '49
Gayley, Andrew W., '55, '56
Gegan, Michael F., M.D., '52
Gerhart, William A., M.D., '53
Gibbons, Francis, '49
Gibbs, F., '50
Gibson, David J., M.D., '51, '51
Gibson, Henry F., M.D., '49
Gihon, Albert L. (B)., M.D., '51
Gihon, James L., M.D., '49, '49, '50
Gihon, John H., M.D., '52
Gillespie, Charles B., M.D., '58
Gilleyland, John B., M.D., '53
Gish, Samuel H., M.D., '51, '51
Gissy, Charles, M.D., '57
Glenn, J. A., '50
Glenn, Thomas A., (M.D.), Honorary M.D., '50
Goadby, Henry, (M.D.), Honorary M.D., '50, '55, '56
Goodwin, Edward J., M.D., '55
Goodwin, Samuel B., '57, '58
Goodwin, Willis W., (M.D.), '57, *ad eundem*
Graham, Jesse, M.D., '48
Graham, John, '51
Graham(e), Thomas (F.), M.D., '57
Gray, Michael W., M.D., '54
Greenawalt, John, M.D., '51
Greer, Thomas B., M.D., '52
Griffith, Charles M., (M.D.), '55, '56
Groff, Henry G., M.D., '53
Grosvener, A. P., '47, '48
Grove, Benjamin F., '55, '56
Guerrero, Jose, M.D., '56, '56, '57, '57
Gunn, J. M., (M.D.), '50
Gunner, Frederick, '50

Hale, Edward P., (M.D.), Honorary M.D., '47
Hale, Peter J., '57, '57, '58
Hales, S., '50, '51
Hall, Albert, '57
Hall, B. F., (M.D.), Honorary M.D., '48
Hall, Ellis B., M.D., '48
Hall, James M., M.D., '55
Hall, Richard, M.D., '50, '50
Haltawanger, J. A., M.D., '52
Haltawanger, Sol. A., M.D., '52
Haman, James, M.D., '51, '51
Hamilton, J. M., '51
Hammill, John R., (M.D.), '55, '56
Hance, Edmund, M.D., '52
Hardee, Charles, M.D., '56
Harley, Thomas, M.D., '50
Harley, Timothy W., M.D., '54
Harlow, John M., (M.D.), '57, '58
Harris, Henry B., M.D., '50
Harris, James, M.D., '52
Hartman, Ami. W., M.D., '54
Hartshorne, Charles, '57
Hatcher, William N., M.D., '57, '57
Hathe(a)way, Joseph C., M.D., '49, '49
Hauser, William, (M.D.), Honorary M.D., '54
Hay, Andrew J., M.D., '53

Haynie, Sydney R., M.D., '58
Hazzard, William H., M.D., '56, '56
Heacock, John M., '47, '48, '48, '49
Heckman, D. P., '57, '58
Heller, Max, M.D., '58
Hendrick, Humphrey G., M.D., '52
Henson, John, M.D., '53
Hepler, Benjamin, '57, '58
Heritage, Joseph Jr., M.D., '51, '51
Hermansader, Charles, '57, '57, '58
Hew(i)ston, George, M.D., '50
Hewston, John, (M.D.), Honorary M.D., '55
Hignutt, John W., M.D., '56
Hilliard, William Lewis, M.D., '50
Hines, David P., M.D., '47
Hitchcock, David H., (M.D.), Honorary M.D., '54
Hitchens, Peter S., '50
Hix, Tom W., M.D., '51
Hoback, Andrew J., '56, '57
Hobbs, Leudlyn P., M.D., '52
Hogan, James, M.D., '53
Hogan, John J., '47, '48
Holmer, Andrew D., M.D., '53
Holmes, Jose (C) B. S., M.D., '49
Holmer, C. B., '57
Holt, John V., (M.D.), '49, '50
Holt, John V., '48
Holterhoff, Julius, '50, '51
Holton, Joseph A., '50
Holton, William B., M.D., '52
Hood, H. H., '50
Hooff, Edward Lee, M.D., '55
Ho(o)pes, Pascal J., (M.D.), '55, '56
Hopes, (Stokes) Theodore A., M.D., '48
Ho(u)rd, Grenville, M.D., '47
Hornberger, Edwin T., M.D., '56, '56, '57, '57, '58
Horner, M., '51
Horton, C. R., '56, '57
Houghton, Charles W., '57, '58
Houghton, John L., M.D., '49
Houghton, John S., M.D., '49
Houston, James H., (M.D.), '48
Houtze, William G., M.D., '53
Howard, Tazewell M., M.D., '55
Howell, C. D., '51
Huckel, Jacob, M.D., '48
Hudson, James T., M.D., '52
Hulshizer, Henry, M.D., 56, '56
Hume, C. Gadsden, M.D., '47
Humphrey, Thomas J. (S), M.D., '52
Hunter, L. N., M.D., Honorary M.D., '58
Hunter, Robert C., M.D., '53
Huot, Louis V., M.D., '51
Hurlburt, S. B., (M.D.), '50
Hutchins, Orrin, M.D., '54, '55, '56, '56, '57
Hutchinson, Richard, M.D., '49
Hutchison, James, '57
Hutton, George, M.D., '52

Ickes (Jekes), Joseph B. D., M.D., '49
Iddings, C. Edward, M.D., 57, 57
Inabnette, James J., M.D., '54
Irwin, Hiram W., M.D., '54, '55, '56
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Memoir of William Nathaniel Bradley (1871–1962)*

By SAMUEL X RADBILL, M.D.

THE passing of William N. Bradley at Wilmington, Delaware, April 17, 1962, deprived the College of Physicians of Philadelphia of one of its oldest and most devoted fellows. With this loss, probably only a half-dozen of our colleagues now remain who still link us to the nineteenth century.

Elected to Fellowship in 1907, Dr. Bradley furthered the work of this College for nearly six decades. For a number of years a member of the Library Committee, a lifelong larger interest was maintained in the growth and usefulness of the library. This library, one of the world's greatest collections of medical literature, vigilantly nurtured ever since the birth of our nation, is our greatest asset for medical learning. Dr. Bradley assiduously collected photographic reproductions of Philadelphia physicians and surgeons in various art media and presented the collection, in 1941, to the library in twenty-three handsomely bound volumes. During the past two decades it has been one of the most used of the library's historical collections.

On April 24, 1905, the Section on Medical History of the College of Physicians of Philadelphia was organized with Roland G. Curtin, Chairman, William Pepper, Clerk, and Francis R. Packard, Charles A. Oliver and Samuel McC. Hamill on the Executive Committee. Dr. Bradley, always fascinated by the medical humanities, was quick to take advantage of the opportunities thus offered and we find him listed as attending the meetings as early as 1906. As long as he lived he evinced a lively interest in the history of medicine. Special reverence for the leading men of medicine led him to preserve meticulously personal letters and other memorabilia concerning many of them in a series of albums which he hoped would eventually form part of the library's Historical Collections.

Born on August 19, 1871, in Felton, Delaware, the son of a farmer, he moved at the age of two with his family to Philadelphia. At the age of sixteen, with the help and encouragement of his uncle, Dr. Samuel Creadick, he entered a drugstore as an apprentice and graduated from the Philadelphia College of Pharmacy in the Class of 1892. He was then able to enroll in the Medical School of the University of Pennsylvania with advanced standing, taking his M.D. degree in 1894. Unable to afford the luxury of the optional fourth year, or even an internship, he was among the first to undergo examination for licensure to practice under a law enacted in Pennsylvania that year. The coveted certificate was received July 1st, 1894, and the same day the hopeful doctor put up his sign.

Practice did not come easily. His uncle and some friendly physicians were helpful. When the doctor was called the patient was rarely in a condition to be out of bed so that house calls were the rule; confinement cases were delivered at home, medical work was arduous and emotionally trying and fees were minuscule. Transportation was not simple, but it was not long before the young doctor could afford a bicycle. This he used for five years before a horse and buggy came along in 1901. Paying patients were moving from the crowded area of South Philadelphia where he opened his first office and a horse enabled him to extend the radius of his calls and follow his practice to the more affluent sections growing up in West and North Philadelphia.

His first attempt at teaching was histology, at Jefferson Medical College, 1894 to 1896. However, in 1896 he was appointed Chief of

* Prepared and published at the request of the Council of the College of Physicians of Philadelphia.

the Children's Clinic at the South Eastern Dispensary and thence-forth his life's work was dedicated to the welfare of children.

In 1909 Dr. Bradley was appointed Medical Director of the Starr Center Association. This post held him securely for the rest of his professional life. The Starr Center, an outgrowth of the St. Mary Street Library founded in 1884, was organized in 1897 to provide welfare services to children of one of the old congested areas of Philadelphia. Besides the library, an open air gymnasium and playground, kindergarten, school gardens, a modified milk station to dispense prepared formulas, a penny lunch station for school children, a visiting nurse service, a medical department for dispensary and home care, and a rainy day society (with the sign of the umbrella—as a health insurance scheme adjunct to the medical department) were successively organized. Infant morbidity and mortality was high and most people were poor. Dr. Bradley instituted many useful reforms for the benefit of the children. Calling his clinic a "Baby Saving Station", he opened satellite stations at convenient points in the community, conducting educational group conferences in infant nutrition and child care to spread the gospel of modern preventive pediatrics in the clinic and home.

From 1909 to 1911 he worked in the Outpatient Departments of the Pennsylvania and Orthopedic Hospitals. For two years, 1910–1912, he taught pediatrics at Jefferson Medical College, then went to the Children's Hospital of Philadelphia (1912–1915), leaving next to take charge of the pediatric department of the Howard Hospital, founded in 1853 for the express purpose of developing specialties in medical practice, and closed in 1929 when the idea of specialization was no longer novel. In 1911 he joined a group of civic-minded physicians to establish the Babies' Hospital of Philadelphia for the treatment of sick children and the education of mothers, and thereafter always promoted the work of that institution. He joined the pediatric staff of the Philadelphia General Hospital in 1917, working actively there, even after deserved retirement, when World War II created a need for all available medical help at home. For ten years (1936–1946) he was also consulting Pediatrist to the Municipal Hospital for Contagious Diseases, and during approximately the same period (1932–1945) acted in the same capacity to the Wills Eye Hospital. No one worked more diligently or with better effect in the care of children at "Blockley" than did Dr. Bradley. Agile in mind and body until the ninth decade of life, he sharply pointed up by example the fallacy of setting any arbitrary date to end the useful period of a man's life. Indeed, he did not quit medical practice entirely until 1955, at the age of 85.

Although he became associated with the undergraduate teaching staff of the University of Pennsylvania in 1919, the best part of his teaching career was given to the Graduate School of Medicine, progressing from instructor to full professor (1921–1946).

In 1901 he was elected to the County, State and National medical societies. As in all other groups with which he associated himself, he energetically participated in the affairs of organized medicine, establishing, with his neighboring colleagues, the South Branch of the Philadelphia County Medical Society, in which he served as President. In the County Society he was vice-president on several occasions and delegate to the state society; in the latter body he was Chairman of the Section on Diseases of Children which he helped to originate. Elected to the Philadelphia Pediatric Society in 1906, he served on its board of directors for thirty years and was twice elected president, during which term of office, among other endeavors, he effected the establishment of the child hygiene division of the Commonwealth of Pennsylvania. The Philadelphia Child Health Society and the Babies' Welfare Association were among other pediatric bodies to which he was attached. When the American Academy of Pediatrics was formed in 1930 he immediately became a Fellow; and at the inception of the American Board of Pediatrics, in 1934, he became a Diplomate.

A frequent contributor to the pediatric

literature, Dr. Bradley's writings in the public press probably had a greater impact. What he wrote and did was directed to his own community, city and state. He reported the first case of pyloric stenosis that was operated upon in Philadelphia; purulent pericarditis, infant feeding and nutrition, tuberculosis in children, the premature baby, congenital deformities, were other topics he touched upon. For the Artisans, as medical director, he wrote a regular series of medical admonitions. More than two dozen unpublished addresses to graduating classes, medical societies, on radio and television, reflect the esteem of the community for his opinions.

Dr. Bradley married Marion Butsch in 1911. They had two daughters, Marion Audrey (Mrs. A. B. Burlingame Harvey), and Jean Claire (Mrs. Carl L. Anderson). At first a Methodist, he later became a Presbyterian in religious affiliation. Leading a faithful life, believing in the tenets of his church, he was always tolerant and understanding of the different religious views of his friends. People liked "Bill" Bradley. A factual person of unswerving integrity, friends, patients and colleagues were affectionately attracted to him. He devoted his admirable life to the good of humanity and the welfare of children.

Memoir of Milton Fraser Percival (1882–1962)*

By FRANCIS F. BORZELL, M.D.

MILTON FRASER PERCIVAL was born in Philadelphia on December 20, 1882. His parents were Mary Fraser, who was a native of Nova Scotia, and Milton Percival, of Yarmouth Port, Massachusetts. Dr. Percival graduated from the Medico-Chirurgical College of Philadelphia in 1905, after a premedical course at Temple University. He interned at the Samaritan Hospital (now Temple University Hospital) in North Philadelphia. In 1906 he served as Chief Resident at this Hospital, and for eighteen months was Chief Resident at the Municipal Hospital for Contagious Diseases.

After this experience he selected Radiology as a career and trained under Dr. Henry Pancoast at the University of Pennsylvania, and with Dr. Henry Graff at the Temple University. Dr. Percival founded and served as Director of the Department of Radiology at the Methodist Hospital of Philadelphia, a post he retained with honor for forty-five years until his retirement. During his active career as a radiologist he was Associate Radiologist to the University of Pennsylvania Graduate School of Medicine and the Polyclinic Hospital.

For five years he was in partnership with the author at 1933 Chestnut Street. After his retirement from the Methodist Hospital he was for a short period associated with Dr. George E. Pfahler in private practice.

His most notable contribution to his specialty was pioneer work in radiation fluorescence and radium. He was co-discoverer of the first radium detector, a forerunner of the Geiger Counter.

Dr. Percival was a Diplomate of the American Board of Radiology, a member and President of the Philadelphia Roentgen Ray Society, and a Fellow of the American College of Radiology. He was Vice-President of the Philadelphia County Medical Society, and served for a number of years on its Board of Trustees. Elected a Fellow of the College of Physicians of Philadelphia on October 4, 1916, he served on its Finance Committee during 1947–48.

One of his major interests was the Aid Association of the Philadelphia County Medical Society where he served many years with distinction as a Director.

Dr. Percival took an active interest in many professional and civic activities. He was President, Secretary, and Treasurer of the Medical Club of Philadelphia, a charter member and President of the Aesculapian Club, and for many years was a Medical Inspector for the Board of Health of Philadelphia. He also served on the Philadelphia Prison Board.

His extra-medical associations included membership in the Union League, the Academy of Natural Sciences, the Geographical Society, the Rotary Club, and the Franklin Institute. At the Franklin Institute he conducted research and arranged an exhibit on Fluorescence.

For many years Dr. Percival's hobby was philately and he was a member of several philatelic societies. He was a devout Methodist and served as Chairman and Vice-President of the Board of Trustees of the Broad Street Memorial Methodist Church of Drexel Hill. He was also a Mason and member of Olivet Lodge.

Dr. Percival served with the Medical Corps of the U. S. Army in the First World War. During his military service he was stationed at Camp Merritt, New Jersey, as Chief of Radiology until his discharge.

The Percivals spent their summers at Pitman Grove, N. J., where Dr. Percival took an active part in local affairs.

* Prepared and published at the request of the Council of the College of Physicians of Philadelphia.

The author of this *Memoir* had the extreme pleasure to have been closely associated with Dr. Percival, especially during the time we were in partnership in Radiology. It is therefore with a great degree of comfort that I can say that, as a man, Dr. Percival was the essence of honor and integrity. He was gentle and considerate of others, often at great sacrifice to himself. As a pioneer radiologist his memory remains dear in the hearts of all who were privileged to work with him.

To have known Milton Fraser Percival was to have known a Christian Gentleman, a true Physician, and a loyal friend. At his passing on January 17, 1962, he left a devoted wife and daughter who cherish the memory of a devoted husband and father—a man of whom they too can well be proud.

Memoir of O. H. Perry Pepper (1884–1962)*

By L. WHITTINGTON GORHAM, M.D.

DR. OLIVER HAZARD PERRY PEPPER was born in Philadelphia on April 28, 1884—scion of a distinguished, intellectually brilliant family. He received his B.S. degree from the University of Pennsylvania in 1905 and three years later graduated in Medicine. In 1938, Lafayette College conferred upon him the honorary degree of Doctor of Science. Among the many honors which were his, too many to mention, was the Presidency of this College during 1943–46.

Dr. Pepper's approach to his life and work is very interesting to follow. His medical activities were centered largely about the University of Pennsylvania, both in the Laboratory and Clinic. By 1929, he had become Professor of Clinical Medicine and six years later, by choice, one of the first full-time Professors of Medicine in this country. His devotion to teaching, the care of patients, and his critical power of analyzing research soon brought him to national prominence so that one honor and heavy responsibility after another were piled upon him. His time of active teaching covered a span of forty-five years which meant that literally thousands of young men were exposed to his influence and example, not only locally, but in various other medical schools and in the meetings of national societies. He was, therefore, primarily a great physician and teacher.

The First World War widened his sphere of influence to a greater extent. It saw him as a Lieutenant Colonel and Chief of Medical Services of Base Hospitals #34 and 69 in France. He was the Consultant for ten units with ten thousand sick and wounded.

On returning home in 1919, Dr. Pepper evidently and correctly felt that he was better fitted for the Clinic than the Laboratory. He also had had a taste of administrative problems and perhaps thought he could see how our Medical Service in the Army could be improved. He was ever critical. The opportunity to do just this came with the Second World War. He was drafted by the National Research Council in Washington to serve as a Chairman of the Committee on Medicine. This committee was composed of the most able and distinguished physicians in the United States. Their duty was to act as Civilian Military Advisors to the Surgeons General of the Army and the Navy.

This was only the beginning of National Service. Secretary Stimson of the War Department turned to the National Academy of Sciences for guidance and advice about biological warfare. The President of the Academy chose Dr. Pepper as Chairman of an Advisory Committee on this intricate and dangerous problem.

The third big responsibility came as a request from the Surgeon General of the Army. Would Dr. Pepper take the chairmanship of the Army Epidemiological Board? This was composed of the "most competent specialists available in the country—either military or civilian". They were to study current information concerning epidemic disease in the Army, and to tell the Surgeon General what to do about it. They investigated influenza, encephalitis, atypical pneumonia, measles, mumps, jaundice following yellow fever vaccination, and infectious hepatitis. The astonishingly low mortality from disease in World War II—the lowest in our history—can fairly be attributed to Dr. Pepper and his Committee.

In 1946, the Veterans Administration knocked at Dr. Pepper's door, asking if he would be Chairman of the Committee on Veterans' Medical Problems. This group was

* Read before the College of Physicians of Philadelphia, 3 October 1962. Prepared and published at the request of the Council of the College of Physicians of Philadelphia.

organized to assist the Chief Medical Director of the V.A. For three years, Dr. Pepper and his associates played an important part in promoting the sorely needed re-organization of the medical program of the Veterans Administration.

In writing this memoir as a contemporary, and close personal friend, I should like to emphasize one fundamental trait of Perry's character which shone through all his working days. Although a brillant teacher and physician who is reputed never to have given a dull clinic, his close, personal friends were especially charmed by his penetrating mind, his ready wit, his wide reading in many fields, his love of the derivation of words which led to the publication of the famous book, *Medical Etymology*—the subtitle of which might well have been "The Antics of Semantics".

Beneath this fascinating exterior, Perry was always motivated by a desire to learn the whole, the absolute truth concerning the many problems and situations where his advice was constantly being sought. The character of this outstanding physician of our generation was built, therefore, on the solid rock of Integrity.

Our College: Past, Present, and Future*

By THOMAS M. DURANT, M.D.

EXACTLY 176 years ago tonight, on January 2, 1787, the first meeting of this College was held in the old Academy building near the southwest corner of Fourth and Arch Streets, a building which was also the home of the College of Philadelphia, the first medical school in the American Colonies. Dr. John Redman, whose portrait you see to your right, just opposite the middle aisle of our auditorium, presided as the first president of the College. Among the other prominent physicians present were: John Morgan, William Shippen, Jr., Adam Kuhn, and Benjamin Rush. Shippen became the second president of the College in 1805, and Adam Kuhn, the third in 1808. The early association of the new organization with medical education, an association which has continued close ever since, is illustrated by the fact that all five of the men mentioned were prominent in the affairs of the early medical school to which I have already referred. Dr. Redman served on its Board of Trustees; Dr. Morgan was its founder and its first Professor of the Theory and Practice of Medicine; Dr. Shippen was its first Professor of Anatomy and Surgery; Dr. Kuhn its Professor of Materia Medica, and Dr. Rush, the successor to Dr. Morgan as Professor of the Theory and Practice of Medicine following the latter's death in 1789.

The Philadelphia of those days was quite different from the one we know today. Dr. W. S. W. Ruschenberger, in his account written in 1886 of the Institution of the College, describes it as follows: "Many of the inhabited streets of the small provincial city were unpaved. Their clayey soil softened on rainy days, adhered to the shoes of pedestrians and impeded their progress. Only the most prosperous physicians rode on horseback to visit their patients. The majority of practitioners had to go on foot in all kinds of weather, and at night light their way with a lantern in hand or borne by a servant in advance".

Dr. Ruschenberger proceeds to describe the medical practice of those days as follows: "All through this period there were nostrum mongers and charlatans as now. A Dr. LeMayeur advertised (1784) that he transplanted teeth, and would give two dollars for each front tooth the owner would permit him to draw. Dr. Hugh Martin cured cancers with a purely vegetable powder, which nobody else knew how to make. In popular estimation it was efficacious. Under a belief that he had died without confiding the secret of its composition to any person, Dr. Rush procured from his executors a few ounces of the powder to use in a case, and endeavored to discover it; he examined the powder and reported to the American Philosophical Society that it contained arsenic".

It was in the attempt to correct such malpractice and to foster the development of the knowledge of disease and the means to prevent, alleviate or cure it that our founding fathers, the giants of 18th Century Medicine established this, the oldest non-State medical society in America. In the 176 years of its existence, the successive generations of Fellows have created a record of accomplishment that we of the 20th Century admire and attempt to emulate. I cannot take the time to describe achievements such as its service as an early Public Health Department for the City, nor can I comment on the long series of educational lectures by leaders of the American Medicine from those days until tonight, nor to many other of the accomplishments of the College, including the establishment and maintenance

* Annual Report of the President, The College of Physicians of Philadelphia. Read before the College, 2 January 1963.

of an exceptionally interesting and valuable museum, founded in 1849, and greatly enhanced by the addition of the Mütter Collection in 1856.

I do want to speak particularly, however, about our Library. In the very early days of the College our Founders recognized the importance of establishing a collection of important medical writings, and on March 3, 1789, approved a plan for such a library. Drs. John Jones, Thomas Parke and Caspar Wistar were appointed the first Library Committee and were authorized to prepare a list of books to be purchased, at a cost not to exceed £50 ($133.33). As time passed these purchases, plus others added to them from time to time, were supplemented by outstanding personal libraries bequeathed to the College by its Fellows. It is because of this, in part at least, that we now have one of the foremost, if not the foremost medical rare book collection in the country. It is of interest in this connection that an English bibliographer, Mr. Richard J. Durling, who has been compiling recently a bibliography of manuscripts and printed editions of Galen's works to the end of the 16th Century, acclaimed our collection of such material second only to that in the National Library of Medicine.

One hundred years after its founding, Dr. S. Weir Mitchell, then president of the College, stated that the Library contained nearly 38,000 volumes and some 20,000 pamphlets, and further that it was, "second in America only to that which the ample purse of government and the genius of the greatest of medical bibliographers, John S. Billings, have created in Washington". How interesting it is that, even in 1887, liberality of government spending was a topic of discussion! It was in Weir Mitchell's days as College president, incidentally, that William Osler was such a familiar figure in the stacks of the Library between the hour of 5 and 6 p.m. each day, and he was, with Mitchell, an active member of the Library Committee.

Today, 76 years after Mitchell's library evaluation, the total of accessioned items is 218,629, almost six times the figure for 1887! The number of journals currently received is 2,559, a seven-fold increase! This is, of course, a very gratifying growth record, and it is because of this that our library has maintained a position amongst the first four medical libraries of the country. But the growth has been costly, and increasingly so in recent years for two reasons. The first of these is the rapid expansion of medical and scientific literature. To illustrate this, I would like to point out that the average number of accessioned items added per year for the past five years has been 3,765, compared to 3,103 for the previous five years, difference of 662 per year. The second reason is the rapid rise in costs, particularly for personnel. In 1949, only 13 years ago, our total expenditure for library salaries was only $21,315. This past year it has been $82,771, an increase of $61,456, or nearly three-fold. Lest it be said at this point by someone that we must have a lavish salary scale, let me hasten to point out that the situation has been, unfortunately, quite the opposite up until now. A comparison with the Harvard Medical Library as of the last of 1961 will make this quite evident. Though the Harvard Library had, at that time, 193,000 fewer bookshelf items than our library, their expenditure for salaries was $91,500 more than ours! If it now be argued that John Harvard is an especially wealthy fellow and that the comparison isn't fair, I may add at once that a recent comparison of our salaries, job for job, with the New York Academy, the Free Library of Philadelphia, or the libraries of Drexel or the University of Pennsylvania shows in each instance that we have been paying less. It has been a marvel to me and to the members of the Library Committee that our Librarian, Mr. Elliott H. Morse, has been able to maintain such a splendid record of service to the public with the salary limitations he has had, and the heavy personnel turnover that has been the inevitable result. The fact that he has been able to do so was evidenced in an editorial in the *Journal of the American Medical Association*, from which I quote as follows: "The

Library of the College of Physicians of Philadelphia is a remarkable library in my (Dr. John H. Talbott) experience, with an impressive number of bound volumes of uncommon and difficult to obtain medical periodicals. Even more important is the willingness of the staff to be of service. The ease with which a nonmember has access to musty or little-used volumes stands in sharp contrast to the austerity manifested in certain other libraries on the Eastern seaboard that treasure similar documents".

From what I have said so far, it must be evident to you that I am leading up to the presentation of some very hard, cold and cruel facts. These are that our College has had a sizeable deficit this past year and will have an even larger one this coming year. Our Maintenance and Reserve Fund is almost exhausted! Uncle Sam may be able to continue fabulous deficit spending but we cannot. There are just two roads open to us. One of these is to cut our spending drastically and allow our fine library to drop out of the leadership group to a second or third rate level. This is the wide road that is easy to follow, but leads to destruction. The other, the straight and narrow road that leads to continued success in our field of service, is the difficult one, but we must follow it. We owe this to our Founders, to all of the physicians who have striven for 176 years to keep our library great, to our city of Philadelphia and its reputation for having a world-renowned library, to the public who, perhaps without realizing it, rely on our library for supplying physicians with up-to-date material, and to physicians and investigators all over the country and as far away as Japan and Australia who call upon us frequently for aid in their work.

What can we do about this? How can we increase our income to keep pace with the expansion of modern scientific medicine? Must we increase our dues appreciably? Your Council sincerely hopes this will not be necessary. On the other hand, we must appeal to every Fellow who can, to add to his annual contribution every dollar he can afford. In considering how much this should be, I suggest that each of you ask yourself, "What would it be like if I did not have this outstanding library? Do I really appreciate the privilege that has been mine, and that of practitioners and investigators here and everywhere?" Certainly I know of no place where contribution money from yourself and your patients can be put to better use, and, in giving it to the College, there is no Charitable Campaign cost to decrease the value of the dollar given. It is, of course, a tax-deductible contribution.

You may very well ask, "What has the College done, and what is it doing to meet the need?" I can answer this by saying that the problem is being attacked in many different ways. First, the S. Weir Mitchell Associates Journal-Endowment plan, originally proposed by Dr. George I. Blumstein, and enthusiastically supported and nourished by his tireless efforts, has been extremely successful, and will provide an increasing amount of support for the library in the next few years. There are now nearly 100 who have become Associates under this plan. Second, Charitable Foundations are being contacted to acquaint them with the important College needs and to encourage their support. Third, Dr. Richard A. Kern is vigorously campaigning for governmental support with the very justifiable argument that our library is an important aid to those who are working under National Institutes of Health Research Grants. Fourth, Dr. Lewis C. Scheffey and his Committee on Bequests is working hard to alert Fellows to the importance of including the College in their wills. This has been an increasing source of revenue in recent years, and can become a major factor in the future.

Now I would like to ask you some important further questions. Have you looked into the advantages of the S. Weir Mitchell Associates plan and considered it for yourself? Do you have an important contact with a Charitable Foundation or in Washington which could be useful in presenting our problem to them? Have you included a College bequest in your last will and testament? Have you considered

what patients you might approach for gifts, and have you yourself given all that you can? I urge you to give full consideration to each of these questions and do it right here and now while the problem is fresh in your minds.

So much for financial problems. In the last few minutes available to me, I would like to tell you of some important new College activities during the past year. These include: (1) The Ghana Medical College Project, (2) The Pew Foundation Revolving Loan Fund for Philadelphia area internes and residents, and (3) the S. Weir Mitchell Associates banquet.

Early in 1962 the Council of the College acted favorably upon a request by the Agency for International Development of the State Department to enter into a contract with Hahnemann, Jefferson, Temple, and Woman's Medical Colleges and the U. S. Government to study the possibility of establishing, with governmental support, a medical school in Ghana, Africa. Russia had been willing to give Ghana a medical school, but their Government asked specifically for an "American style" school. Our State Department has considered the fulfillment of this request a high priority project, and it is planned that the money shall be loaned to Ghana on terms that it has willingly accepted. In March of 1962 a committee consisting of Drs. William N. Parkinson, Chairman, Harold A. Taggart, Samuel G. Conley, Ernest E. Aegerter, and H. Walter Forster, Jr., flew to Accra in Ghana for several weeks of intensive study of the situation. Their detailed report indicated the great need for a medical school there, and favored the cooperation of the four Philadelphia medical schools and the College of Physicians in providing a faculty to institute a teaching program in September 1964. Since the return of the Committee, an office has been established in the College building with Dr. Parkinson as Campus Coordinator, and negotiations have continued with the medical schools and the Government for the completion of a consortium type contract, and for the appointment of a Dean as the first steps toward the fulfillment of a project of utmost importance in international relations. Our Legal Counselor, Mr. Eric A. McCouch has given liberally of his time in advising and checking the legal details of our dealings with the Government and the medical schools, and we owe him a great debt of gratitude for his inestimable assistance. It is to be hoped that my report next year will be one of great progress toward our objective. Little did our Founders realize that their educational aims would one day become international in scope! I should like to add, incidentally, that the Ghana school will be the first government-supported medical school on foreign soil to be "started from scratch". A great responsibility has been placed on the shoulders of the four medical schools and the College of Physicians of Philadelphia.

The Pew Foundation Revolving Loan Fund had its origin during the latter part of 1961 when that Foundation gave the College $25,000 for the purpose of surveying the financial status of internes and residents in the Philadelphia area, and of providing some funds to aid the most needy. Mr. Pew was impressed by the fact that this group of physicians suffers a particular hardship in life in view of the miniscule stipends received by them after years already spent in medical school training. Under the guidance of our Fellow, Dr. David A. Cooper, to whom we owe much, Mr. Pew was led to request that the College undertake the survey and administer the Fund. During 1962, a Committee of the College consisting of Dr. Cooper, Chairman, and Drs. T. Grier Miller and Truman G. Schnabel, worked hard in performing the desired study which did indeed provide evidence of a great need. A Revolving Loan Fund has now been established and loans will be made to an initial four particularly needy young physicians. It is our sincere hope that this Fund will grow and will be increasingly valuable in the years to come.

The Weir Mitchell Associates banquet was held on October 31, 1962, and was undoubtedly the outstanding social event of the College year. This hall, named in honor of Dr. Mitchell,

was used, and Dr. Harry E. Bacon's Entertainment Committe, with the aid of Mr. George S. Allen and his staff, were eminently successful in transforming it into one of the most attractive banquet scenes I have ever witnessed, and in providing an outstanding program. The February 1 issue of *Philadelphia Medicine* will contain photographs memorializing the occasion. We were particularly fortunate in having Dr. John H. Talbott, Editor of the *Journal of the American Medical Association*, as the speaker of the evening, and his talk on the topic, "S. Weir Mitchell", containing new information concerning our great Philadelphian, will long be remembered by the 86 Associates inducted on that occasion, and by the prominent guests. It is to be hoped that the banquet this year will prove to be an equally auspicious occasion.

You can see from what I have said that this past year has been a very important one in the long and epic history of our College. We have great problems to solve as we look into the future, but I am sure that we will solve them, and will press forward in an ever increasing service to our own community and to the world. I cannot do better in closing than to quote from a talk given by Dr. Alfred Stillé on the occasion of our 100th anniversary in 1887, "Let us hope that so fair a flower of science (i.e., the College) shall not languish through indifference, neglect, or indirection, and that at the end of another century our posterity shall be able to speak of us with unstinted praise, and with as sincere gratitude as we now feel toward those who prepared the way for this goodly habitation and temple dedicated to the service of humanity".

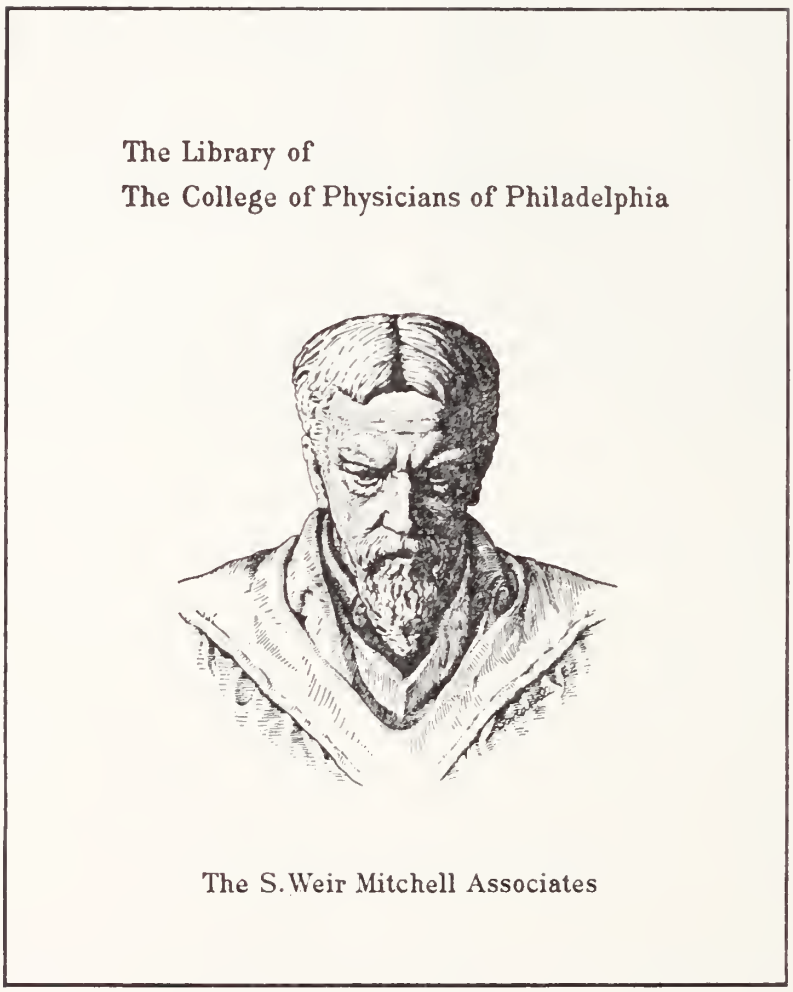

FIG. 1. Bookplate designed by Miss Edna Hill, medical artist to the Hospital of the University of Pennsylvania for use by The S. Weir Mitchell Associates (1962).

S. Weir Mitchell[1]

By JOHN H. TALBOTT, M.D.[2]

WHEN the President of your College extended an invitation to present another interpretation of the influences of the first citizen of Philadelphia in the 19th century, I could not resist. Until a short time ago, Silas Weir Mitchell meant little more to me than the name of a highly regarded Philadelphia psychiatrist and novelist of the past century. Albeit, a note of respect was attached to the name of S. Weir Mitchell; unfortunately neither an understanding nor appreciation of the personality had been revealed to me until two leisurely weekends spent in perusal of his literary and medical contributions opened wide my eyes. However casual this perusal might appear to the medical historian, to me it proved an exciting experience, since for the first time the full impact of this man's versatile genius struck me as I contemplated the accomplishments of this celebrated 19th century figure: physician, investigator, scholar, novelist, poet, story-teller, letter writer, neurologist, and pre-Freudian psychiatrist.

Although the reaction of the professional historian to the re-examination of biographical data is unknown to me by personal experience, nevertheless I think we may safely assume the challenge would be met enthusiastically. In any event, the assignment offered me by Dr. Durant stirred me with pleasant anticipation. More recent endeavors have produced a document only a few pages longer than my first essay. In contrast, it represents a greater expenditure of time devoted to a deeper research, a reviewing of material about the life and works of Mitchell, including the sources in this country of his unpublished documents, while reviewing the two best biographies—those by Burr (1) and Earnest (2).

If the first attempt led to reverence, subsequent labors led to endearment, the all-too-frequent lot of the fully-committed protagonist. The non-professional biographer can generously and genuinely endorse the subject of his study with increased stature and possibly more favor than the objective scholar, jealous of his reputation, of accuracy, and fearful of being betrayed by emotion. Hence I frankly profess no formulation of an impartial interpretation, but freely predict my remarks will betray my admiration and even affection for Mitchell's educational background, aspirations, and multiple accomplishments—an inevitable pitfall of a dedicated and not always unbiased biographer. In extenuation, I urge the consideration of the biographer as often subtly revealing an identification with the best in the object of his veneration and study. For example, not to speak profanely, Boswell certainly gave evidence of this tendency in his association with Johnson. Some even project themselves so deeply into the preparation and exposition of a biography as to reveal their own outlook on life as much as they reveal that of their subject.

S. Weir Mitchell was first a Philadelphian, but always a loyal American in the 19th century interpretation of loyalty, with sympathy and deference to the medical and literary accomplishments coming out of Europe that in the aggregate far surpassed in Mitchell's childhood those of contemporary Americans. Mitchell busied himself with filling this gap and contributed greatly to the growing ascendancy in the new world of clinical medicine, experimental physiology and literature—a position soon to challenge the accomplishments of the old world in each discipline.

[1] Read at the First S. Weir Mitchell Associates banquet, The College of Physicians of Philadelphia, 31 October 1962.

[2] Editor, *Journal of the American Medical Association*, Chicago 10, Illinois.

This evening I propose to cite interests, events, and contributions (some important, others unimportant), but each appealing to me and in my judgment relevant to an essay on this medical man of letters. I judge no institution or edifice more appropriate than the Library of the College of Physicians of Philadelphia, no better opportunity to recommemorate Doctor Mitchell than at this formal inauguration of the S. Weir Mitchell Associates Program. This program is off to a fine start, under the aegis of Doctor George I. Blumstein, to provide a much-needed endowment for medical journal subscriptions.

Silas Weir Mitchell was born February 15, 1829, into a family of culture with one gene for literature, another for science. Although the evidence is not conclusive, the birthplace is assumed to be 119 South Fifth Street, presently an undeveloped area on Independence Square near the new home of the American Philosophical Society Library. A few weeks ago I visited this site, as well as that of Mitchell's residence and office at 1524 Walnut Street. An office building stands on the latter spot, bearing an inscription in stone which reads:

On this spot stood the house of S. Weir Mitchell.
Physician, psychologist, man of letters.
He taught us the use of rest for the nervous.
He created Hugh Wynne.
He pictured for us "The Red City" in which he lived and labored from 1829 to 1914.

From what I was able to discover from his associates and biographers, Mitchell was not a dour Scot, yet there was abundant evidence of the heritage of Scotland in his blood and bones and brain. His paternal grandfather, born in Scotland, emigrated to the United States. His father was born in the States but received his academy and undergraduate training at the University of Edinburgh.

S. Weir Mitchell was tall and slender, standing over six feet in height. He wore a van Dyke beard and, in several of his studio photographs and oil portraits, he wore what appears to be a heavy homespun suit. He was a handsome and well-built man, emanating charm and subtle sophistication. An extensive correspondence with the opposite sex reflects mutual attraction but no hint of impropriety.

One of his sons inherited his father's literary talents, was an author and a playwright with the pen name of John Philip Farley. The younger son inherited his father's medical and scientific aspirations.

I intend to offend no one with a comparison between what I consider were the two medical and literary centers of America a century ago; that is, Boston and Philadelphia. The medical men of Boston in the 19th century were the Warrens, Jacksons, Shattucks, Bigelow, Fitz, and Bowditch; whereas Morgan, Shippen, Redman, Rush, Wistar, Coxe, the Meigs' and the Peppers were outstanding in Philadelphia. There were a select few in these two seaboard cities whose contributions went beyond clinical medicine and the medical sciences. In Boston, Oliver Wendell Holmes was physician and littérateur; in Philadelphia, Mitchell occupied a similar position. Holmes attended the academy at Roxbury, college at Cambridge, and the Harvard Medical School in Boston; Mitchell attended grammar school and the John Ferris Academy in Philadelphia, pursued undergraduate studies at the University of Pennsylvania, and completed his medical course at Jefferson Medical College. The M.D. degree was granted to Mitchell in 1850 at the age of 21, at the time when Mitchell's father occupied the chair of the practice of medicine. He, like his son, was a littérateur as well as physician.

The father, John K. Mitchell, had graduated from the Medical Department of the University of Pennsylvania, the sixth physician in the family in two generations. In time away from his professional chores, John K. Mitchell compiled a dictionary of quotations and composed "Johnson's Poets." He has been judged a better investigator than his son, particularly for his insights into immunity and the pathogenesis of disease.

William H. Welch of Johns Hopkins University wrote to S. W. M. upon receipt of John K. Mitchell's monograph on fevers (3).

My Dear Dr. Mitchell,

I am delighted to get the copy of your father's book on the cryptogamous origin of malarious and epidemic fevers and I appreciate very much your generous kindness in parting with one of the two copies which you had. The inscription in your own handwriting at the beginning of the book enhances for me greatly its value.

I have repeatedly made reference to this remarkable book in articles which I have written. It's the work of a great medical prophet.

Thanking you most cordially, I am

Most Faithfully Yours,
William H. Welch

A letter of May 8, 1862, dispatched by Oliver W. Holmes to S. W. M., contains praise for John K. Mitchell, as well as commendation for Mitchell's verse and zoological experiments (3).

My Dear Sir:

I am very pleasantly reminded of you by the receipt of your paper on the circulation of the snapping turtle and perhaps even more agreeably by the spirited lines, "How the Cumberland Went Down", which appears as its poem. The union of poetry and science under the same cover reminds me of the time when Ronsard prefixed his verses to the collected works of Ambroise Paré. I only wonder how you can write so good poetry with such a gift for true scientific observation. I was walking here last evening with Agassiz, who had been working out the neuroglia of an-aluta (ostracode) and an-ophra (I forget their confounded names), when he asked me how these details in a specialty impressed me; as I listened, I told him I liked to follow the workings of another's mind through these minute-teasing investigations—to see a relentless observer get hold of nature and squeeze her until the sweat broke out all over her and splinters loosened, but I could not bring my own mind to it. He thought I should not be the poet he was pleased to consider me, if I could. However, you who have a great deal more science in you than I ever had, must remember Haller and Goethe and make the most of both your talents by either of which I have no doubt you can achieve a reputation.

The researches on the poison of the rattlesnake interested me beyond any paper I had read for a long while. I am delighted to see that the same love for original research and capacity for it which made your father's name early known to the scientific world are coming out in still greater force in yourself, and as if nature would not put out one light without kindling another, that his poetic taste and talent bid fair to reach a still further development in his son. It will give me great pleasure to keep pace with your growth and to take cognizance of your efforts in various directions, hoping that I may have a chance sometime or other to aid you in word or deed.

Very Truly Yours,
O. W. Holmes

The transition for Mitchell from college to medical school was associated with interminable hours of drudgery in anatomy, which he counterbalanced by the courses in physiology, with laboratory exercises and physiological investigation. How many of us who have not pursued a lifetime career in surgery or orthopedics would gladly have skipped anatomy and started our medical training in physiology and clinical experience at the bedside? Mitchell was placed in Doctor Thomas Dent Mütter's office, in the hope that surgery might offer considerable appeal, but Mitchell fainted during a surgical operation. This was sufficient to dispel all thoughts of a career with scalpel and hemostat.

Following graduation from Jefferson, and in keeping with the tradition of his time, Mitchell left for Europe for post-graduate medical training. He lived in the Latin Quarter of Paris, attended the ward walks with Chomel, the best bedside teacher in Europe, and the physiology lectures of Claude Bernard, the father of experimental medicine. The impact of these outstanding men of the clinic and the laboratory in the great days of Parisian medicine was apparent throughout Mitchell's professional life. He became a fine bedside teacher and used his background in physiology for the understanding of clinical problems. While in Paris, not having followed the advice of Boylston and Waterhouse on vaccination, he contracted smallpox from a patient on Chomel's service.

After graduation, Mitchell vowed that by the age of thirty-five he would hold a chair in the medical sciences, either at Jefferson or at the University of Pennsylvania. This vow was never consummated. His first attempt, at the age of 34, was the chair of physiology at Jefferson; in the same year a similar position was sought at the University of Pennsylvania. Mitchell was unsuccessful in each instance. John C. Dalton, Jr., Professor of physiology at

the College of Physicians and Surgeons in New York commiserated on the failure:

Dear Sir,

I have received your Smithsonian book on the respiration of Chelonis, (May 4) and promise myself great pleasure in reading it. It is a subject which I wished very much to study myself two or three years ago—in connection with that of the circulation in turtles, but was prevented. Will you not be tempted to go ahead and study the action of the circulatory apparatus in these animals more fully than has yet been done? The turtles are very interesting to me. They come so near to being mammalia in the characteristics and importance of their organization, and yet their tissues are as clean and distinct—and easily dissected as those of frogs and lizards. I hope you will get something more out of them.

I am sorry to hear you were not appointed to the physiological chair in the university. However, the loss is not all on your side.

Yours Very Truly,
J. C. Dalton, Jr.

Disappointments such as these must have dampened enthusiasm for academic medicine, but not for long. Five years later, Mitchell's name reappeared on the panel for the chair of physiology at Jefferson. Supporters of this appointment again were Dalton, Austin Flint of the Bellevue Hospital Medical College, Jefferies Wyman of Boston, and C. E. Brown-Séquard—strong men to support one. Brown-Séquard, who occupied the chair of physiology at Harvard for a short period, wrote as follows (3):

April 16, 1868

To the Board of Trustees of the Jefferson Medical College.

Gentlemen,

I beg to certify that Dr. S. Weir Mitchell justly stands very high among physiologists, not only of this country but of Europe also. I willingly bear witness that in the old world as well as here, he is well known as an enthusiastic lover of science, as a most ingenious experimenter, as a discoverer of very important facts, doctrines of laws in physiology and in scientific and practical medicine, and as a clear, forcible and learned writer.

I sincerely believe that, even if the vacant chair were opened to the competition of European as well as American physiologists, few of the competitors could occupy that chair with so much benefit to the students and so much credit to themselves and to the college as Dr. S. Weir Mitchell.

With much respect, I remain,

Yours Truly,
C. E. Brown-Séquard

A letter from Jefferies Wyman, professor of anatomy at Harvard College, reinforced Mitchell's case:

To the Trustees of the Jefferson Medical College:

The undersigned would respectfully offer his testimonial in behalf of Dr. S. Weir Mitchell, a candidate for the chair of physiology now vacant by the resignation of Dr. Dunglison.

Dr. Mitchell's reputation as a physiologist, his many contributions to the projects of physiological science, the high appreciation of those in Europe as well as America, and his eminent attainments in various departments of knowledge ensure qualifications of the highest order for the office for which he is a candidate.

The undersigned would therefore respectfully express the conviction that the appointment of Dr. Mitchell to the chair of physiology cannot fail to give new lustre to the reputation of the Jefferson Medical College which enjoys so largely the respect and honour of the Medical World.

Jefferies Wyman
Cambridge, Mass.
April 18, 1868

But history tends to repeat itself. After a third disappointment, Mitchell must have abandoned hope for an academic post. Years later, while serving as a trustee at the University of Pennsylvania, during his absence from one of the sessions for a few minutes, the board seized the opportunity and appointed him professor of physiology. He resigned the chair upon his return to the room, after being advised of the presumptuous action!

It is as difficult to understand Mitchell's failure in his application for an internship at the Pennsylvania Hospital as his failure in an academic appointment. I recollect no other ultimately successful, outstanding clinician and scholar who met such a lack of success in obtaining an internship, and who was rebuffed in turn by two medical faculties.

I admit that correspondence may be as revealing as any document in the biography of a noted person. That which is composed *ex tempore* represents the spontaneous response

without benefit of retyping or redrafting. To me, correspondence is part of living. It is almost as blessed to give as to receive it. Mitchell was an insatiable letter-writer and letter-receiver. I envy Mitchell as much for this happy experience as for any.

As some of you know, the Josiah Trent Collection in the Duke University Library contains the greatest number of letters written to Mitchell. Many of the published letters have appeared in Burr, while Earnest and Mumey (4) have also used excerpts freely in their biographies. I am indebted to Mrs. May Duke Trent Simmons, Curator of the Trent Collection, Duke University Medical Center Library, for allowing me to peruse the collection and to use the letters in this essay. Several full-length letters are indicated in my presentation with little relevancy to organization. Flexner's letter is an example.

May 25, 1908

My Dear Dr. Mitchell,

A slight illness which kept me indoors for two weeks prevented me from replying earlier to your very kind and encouraging letter of April 23rd. It is most kind of you to refer so generously to my work in New York which, in some respects, has succeeded far beyond any personal merits that I may possess. But I find your reference to our pleasant relations in Philadelphia especially gratifying. I think you can be under no misapprehension as to the great value to me, during my Philadelphia residence, of your constant sympathy and cooperation. In fact, you succeeded, whether with intention or merely through accident and circumstance, in sending me away from the University and to New York!

I believe that you will like Noguchi's monograph which is now in the hands of the Carnegie Institution being prepared for the press.

With my best regards, I remain,

Very Truly Yours,
Simon Flexner

The practice of medicine was begun by Weir Mitchell in his father's office in 1851 when the science of medicine, as we understand it today, was just emerging. Devoted as was Mitchell to scientific medicine, he never permitted this emerging vital force to supplant the art of medicine—only to implement it. He was able to combine interests and attainments in laboratory and clinical investigation with a rewarding clinic and private practice. His first contribution (1852) in medical science, "Observations on the Generation of Uric Acid and its Crystalline Forms," was the only discussion of uric acid and gout that I discovered among his writings. On the other hand, a deep interest in snake venoms was maintained for decades. By 1860, he had published a monograph on this subject under the auspices of the Smithsonian Institution, which, as modestly interpreted by Mitchell, "most enormously advanced the subject of snake venoms." The studies, later pursued in collaboration with Edward T. Reichert, professor of chemistry at the University of Pennsylvania, concentrated on the premise that venom was composed of two factors: a peptone and a globulin. In a letter of January 13, 1882, O. W. Holmes was facetious and serious about the snakes (3):

296 Beacon Street

My Dear Dr. Mitchell:

My letter of thanks for your beautiful volume of poems must have crossed you *en route*. You have it, no doubt, before this time.

I am mightily interested in your snake-experiments and hope to have a full account of them by and by. Do send me that snake-skin you speak of and perhaps I will wear it for a neck-tie.

Don't let em bite you! Remember poor Dr. Wainwright and how near you came to being crotalized into Hades by the fellow that turned round in his box. If you play any such tricks with your "worms," as Bacon calls em, I won't write your obituary for G.W.C.'s paper. (George W. Cutd's Public-Ledger.)

Good luck to you and the varmits.

Faithfully Yours,
O. W. Holmes

In these studies, Simon Flexner, of the University of Pennsylvania at that time, but later Director of the Rockefeller Hospital for Medical Research, and his research associate, Hideyo Noguchi, were clearly identified. When Noguchi came to America in 1903, following a casual invitation from Flexner, he was without funds or a fellowship. Mitchell filled the void and provided these for Noguchi to begin his investigative career in America. Portions of a letter from Noguchi to Mitchell of October 5, 1905, are as follows (3):

The happy tidings from you appeared to me as if a dream. I am too much excited with them and cannot stop the involuntary trembling of my hands. "Ich zittere mich vor freude". I do not know how to thank you. Please perceive and share my happiest feelings. A gift—the gift—from you—from a world-renowned scientist!

I will attempt *not to kill the gift*, and so I dare to accept this most grateful donation with my sincerest thanks.

Hideyo Noguchi

No great physician can pass through a rich professional career without at least one eponym. Mitchell's Disease is erythromelalgia (5). The title of his original communication was: "On a rare vaso-motor neurosis of the extremities,* and on the maladies with which it may be confounded." Mitchell wrote:

A few years ago I published in the *Philadelphia Medical Times* (1872, pp. 81 and 113) a brief paper upon certain painful affections of the feet, and drew attention to a form of foot-disorder which I was unable to find fully described elsewhere. This paper attracted little attention; and I now find myself called upon, by a larger and more fertile knowledge, to review the subject. . . . I have called it a rare disease, because, in a large experience, I have seen but few cases; yet it is likely that, when once recognized, it may be found to be more common than I now conceive it to be.

The patient, nearly always a man, after some constitutional disease, like a low fever, or after prolonged physical exertion afoot, begins to suffer with pain in the foot or feet; usually it comes in the ball of the foot, or of the great toe, or in the heel; and from these parts it extends so as to involve a large portion or all of the sole, and to reach the dorsum, and even the leg. More often it is felt finally in a limited region of one or both soles, and does not extend beyond these areas. . . . By and by it comes on whenever the upright posture is assumed, or even when the foot is allowed to hang down. Since, however, the disease is not necessarily progressive, there are instances in which the pain never passes a definite limit.

In rare cases, the first pain is said to be an ache of the foot; but in the mass of instances, and soon or late in nearly all, the pain is of a burning character. "It is the pain of a burn; "the pain of mustard;" "of intense sun-burn;" at least these are the phrases used to describe it, and certainly the character of the suffering is often so well marked as to be clinically distinctive. In the later stages of the disease the pain is throbbing, aching, and burning, owing, I suppose, to the vasal disorders, which are seen in some cases throughout, and always in the graver examples.

The next striking peculiarity of this disorder is the flushing of the part upon exertion . . . in the graver examples, the area of greatest pain in the soles or hands is distinctly and permanently marked by a dull, dusky, mottled redness, as if the smaller vessels were always over-distended. In these and in some of the less severe cases, the region of pain is in places tender, and firm pressure by the finger or hand will bring on increased pain, and even cause the whole foot or hand, or a part of it, to become red, just as it does when the man stands up.

In 1846, one of Mitchell's first literary gems, "To a Polar Star", appeared in the *Nassau Monthly*, evidence perhaps of impartial treatment of vivid literary efforts of other Ivy League members. O. W. Holmes, his counterpart in Boston, was somewhat critical of Mitchell's composition and cautious when Mitchell implied that Holmes might have some influence with the Rev. Edward Everett Hale, editor of Boston's *Atlantic Monthly*.

Mitchell desired an outlet in this periodical of high repute. His efforts were crowned with success with the publication of "Little Gold Dollar" in the *Atlantic* for July, 1857. When "The Case of George Dedlow" appeared, W. W. Keen congratulated Mitchell on, "having fallen into the Atlantic."

When S. W. M. was in full literary maturity, O. W. H. spared no superlatives in praise, one letter following the other in rapid succession (3).

Beverly Farms, Mass.
October 4, 1882.

My Dear Dr. Mitchell,

I found the magnificent paper-scimitar on my table yesterday and could not help thinking it was meant to remain there. Only it is too gorgeous—too grand—for such a humble literary work-bench. No matter; it shall stay there and divide the honour with the one Miss Thackeray sent me some years ago.

The riddle of it is one of the best in the English language. I doubt if there are ten or even five—I am not sure there are three which can compare with it in finish and in the perfection of its graceful double meanings. If you only left this to consult me about whether it would be a fitting present—I say for the Queen or the President—or Mr. Gladstone or Victor

* The foot and hand disorder I am about to describe may be conveniently labelled Erythromelalgia; ἐρυθρος, red; μελος, a member; αλγος, pain.

Hugo—why, I shall say certainly it is more than good enough for the best of them. If you meant it for me, I can only say I thank you most heartily for the gift of which any author might be proud engraved with lines which he will never look upon without wishing he had written them.

Believe me, dear S. W. Mitchell,

Faithfully Yours,
O. W. Holmes

* * *

Boston: 296 Beacon Street
January 12, 1883.

My Dear Dr. Mitchell,

I would not thank you for your poems before I had read them, but now, having read every one, I can thank you, first for your kind remembrance in sending me the volume, secondly for the elegant, broad-margined form in which it greets me, and lastly for the poems themselves. A great physician like yourself has no reason to write so well. I find fancy, sentiment, coloring and musical cadences in the poems, which I, who read very little new verse, and hardly look into most of the volumes which are sent me, have enjoyed, and with a certain surprise that with your philosophical habits of mind you should have developed so pleasing a gift in so artistic a form.

I hope you feel encouraged to vary your hard labors with frequent excursions into these flowery fields when you find yourself at home, and I am not sure that you may not find that many of your patients will themselves as much better for reading their physician's poems as from following his prescriptions. At least you may be sure of one thing—that you will have as attentive and as gratified a parish of readers as any of your fellow-friends who preach from the pulpits of Parnassus.

Always Faithfully Yours,
O. W. Holmes

In 1890, after more than a quarter century of exchange of correspondence, Holmes dropped the professional formality and addressed Mitchell as follows (3):

My Dear Mitchell,

I must drop the doctor in addressing you after the letters which have passed between us.

I got your little book "Dr. and Patient" for which, to begin with, I thank you most cordially. I sat down to read it,—a thing I rarely do with a book which is sent to me. I was so delighted with its freshness, its good sense, its agreeable style; the practical use that I felt must be to great numbers of readers, that I made up my mind as soon as I finished it I would write you a letter of unsparing praise. All at once I came upon a reference to myself of a very pleasing character, but which took the mind out of my intended compliment. All I can say in praise of your book would look like tit-for-tat—lick-for-lack as for when two cows perform that kindly offer for each other.

O. W. Holmes

In the Trent Collection, letters from Brown-Séquard, are second in number to those from Holmes.

Cambridge, Mass.
January 17, 1867.

Dear Doctor,

Would you be so kind as to tell me if your papers published by the Sanitary Commission for the Medical Department of the Army are to be procured from some publisher and whom? I need them almost at once and would be much obliged to you for the information I ask. I have one of them (on reflex paralysis). The others I never saw.

I send you a table of my old journal and a prospectus of the new one. The first one has just been published with most excellent papers by Charcot, Bouchard, Vulpian, Prevost, Guyon, and several others. I would be glad to publish in it anything new, and to analyse any recent publication from yourself.

Hoping to see you before I leave for Europe in March next, I remain,

Very Cordially Yours,
C. E. Brown-Séquard

The first novels written by Mitchell were published anonymously, lest the public misunderstand his desire to exhibit his literary talents and think less of him as a physician. The first signed novel, "In War Time", was written in Newport, Rhode Island, and appeared serially in the *Atlantic Monthly* in 1884. Not until he was 68 years of age did he receive the acclaim that comes to a novelist who has extended his best efforts to compose the "Great American Novel." Mitchell's effort was "Hugh Wynne—Free Quaker," a story of Philadelphia during the Revolutionary War. Following publication of this two-volume historical novel, Mitchell received a number of unsolicited comments. The following note on "Hugh Wynne" came from a female admirer in Ohio (3):

Dear Doctor S. Weir Mitchell:
Dear and Honored Sir,

A gentleman said to me the other day that he shall always regret never having told Robert Louis Stevenson how much he loved him and that he believed the writers of books were pleased to receive words of love and praise

from appreciative readers, no matter how obscure they might be. Acting on this principle, lest I suffer similar regret, I venture to tell you how much pleasure your novel, Hugh Wynne—Free Quaker, has given my husband and me.

We read it together last fall, in the quiet evenings with unfailing delight, finished it at last one midnight with bated breath and tear-moistened eyes.

Mrs. Frank C. Eaton
Redroof Cottage
Columbus, Ohio.

Winston Churchill published a review of "Hugh Wynne" in "The Book Buyer" (6):

Broadly speaking, there are two kinds of books: those which will bear reading once, and those which may be read many times over and still do not lose their charm or fail in their instruction. To this second class belongs Dr. Mitchell's "Hugh Wynne." Indeed, I had almost said Mr. Pyle's "Hugh Wynne" as well, so inevitably is the artist connected in my mind with the creation. Both have succeeded in stamping upon it that rarest and most elusive of qualities—reality. The story is now set forth, as it should be, in this continental edition, as the memoir of one who lived in the city of the Penns during those stirring times in which our young republic was born.

Mitchell's last novel appeared when he was 82 years of age, "Westways".

Usually his unsolicited letters were flattering; a few were critical. The fate of an author does not change with the times. No one who writes today can expect immunity from critical comments (3).

January 5, 1891

I have just finished in the December *Century* the first installment of *Characteristics*. To say it delighted me but faintly expressed my feelings.

I am by profession a physician, by creed, a homeopath, and it is inconceivable to me how one who occupies as you do the highest pinnacle of fame as a physician and who is capable of writing such a story as *Characteristics* bids fair to be, could stop in the midst of such a story and take a fling at an honorable enemy as is done in C's letter to Dr. North. I should think that such an interpretation would "like a toad, sit in one corner of your mind and sneer at you."

Dr. J. C. Daily
Physician and Surgeon
Ft. Smith, Ark.

Travel in America and abroad, the out-of-doors, and a love of nature were part of Mitchell's life. Newport, Rhode Island, and Bar Harbor, Maine, were favorite vacation spots in the United States. Newport, before the days of the jazz festivals, was described by Mitchell as a, "queer old place, full of very modern yankees and very ancient houses, both ready to take you in." He would tramp for hours in the woods; a fishing trip was much to his liking. Fishing for salmon on the Restigouche River in Canada, or a trip through Yellowstone Park, was as delightful as a small social dinner in urban Philadelphia.

Mrs. Mitchell was his foil at dinner parties, a loyal companion of genuine character who appreciated the greatness of her husband without resort to flattery. At work and play, Mitchell loved friends, leisurely dinners, scintillating conversation, good wine—especially madeira and champagne—and strong cigars.

Three quarters of a century ago, the indexing of world literature was experiencing great difficulty because of inadequate financial support, as it has from time to time in the interim. One of the earliest difficulties occurred in 1895 when the Congressional subsidy was withdrawn from *Index Medicus*, started by John Shaw Billings. Publication was then suspended until 1903 when it was resumed under the patronage of the Carnegie Institute, largely through the new efforts of S. W. M. and the renewed efforts of Billings. Billings wrote to Mitchell on his 75th birthday, excerpted as follows (3):

February 14, 1904
40 Lafayette Place
New York

My Dear Weir,

Schuyler tells me that tomorrow is your birthday. This being St. Valentine's Day, I think it not improper to send you a little love letter by way of expressing my feelings.

One by one the majority of my old friends have passed away, but so long as you remain, life is still worth living for me. I do not need to give reasons for my affection for you—there are many of them, but the essential thing is that I have it, and that when I think of you it is not as a great physician—or as a poet—or as a leader in science—but as, "Weir,"—just "Weir," And I have a comfortable cardiac (or pre-cardiac) sensation in the thought that I have the right to call you "Weir." May you live long to enjoy life as you do, and when the end comes—may it be painless and prompt. I mean by

this the end of this life—but I don't think that that will be the end for you—but rather that it will be a new beginning.

J. S. Billings

In the practice of medicine, Mitchell's methods of reaching a diagnosis were direct, straightforward, and usually rewarding. He was alert in the investigation of a patient's symptoms, whether the complaints were insignificant or serious. Before the days of antimicrobials, anti-inflammatory agents, antihistaminics, anti-metabolites, anti-peristaltic pills, and anti-apprehension preparations, a capacity for sensing the character and whimsies of his patients stood Mitchell in good stead. A reference to a non-medical subject of interest to the patient brought him at once on common ground that proved of inestimable value. Although I could find no mention of his management of patients with cancer or other immediately fatal maladies, it takes little imagination for me to visualize his rapport with the sick by the reference to a subject of mutual interest. It frequently works today as it did a century ago.

Mitchell's best known contribution to the art of medicine, in the judgment of many of his contemporaries, was the theory of the value of a simple regimen of rest—physical and mental—which meant isolation, environmental and psychological. Rightly or wrongly, as evaluated by current practices, when the surgeon urges patients out of bed before the anesthetic hardly has worn off, and the maimed of muscles, bone and tendon begin physiotherapy at a phenomenally early stage in convalescence, and when the only moments of rest permitted the housewife unable to solve her emotional problems are on the psychiatrist's couch, Mitchell's theory of rest is somewhat novel. Through it he established an enviable reputation at home and abroad. The treatment was so simple and the results so effective that he was accused of being a charlatan and a quack. Professional associates could not understand the far-reaching effects of his therapy and could not believe that his personality, as is so well appreciated today, was probably the most important aspect of his management of the sick affected with organic or psychosomatic illness. Many of us today believe that, important as drugs are in the treatment of disease, the physician's compassion is as important as ever, particularly when drugs are lacking or provide only incomplete correction of the affliction; without the one, the other fails to achieve maximum effectiveness.

The story recounted by Mitchell's biographers of his knavery with a neurotic seems worth repeating: a fashionable lady had taken to her bed, feigning organic illness. The yarn would be less interesting if enacted in any environment other than the boudoir. Mitchell's medical admonitions to get out of bed were ineffective until he threatened to get into bed with his patient! By the time his jacket was removed and his trousers began to fall, this fashionable lady decided that the farce had gone far enough. She jumped out of bed, which terminates the tale!

Although Mitchell was not a prude, the restraining influence of his puritanical background supported a conservative approach to the subject of sex. The daughter of a well-to-do New England family from Bangor, Maine, was undergoing treatment for the then-popular malady among the social élite, "a nervous breakdown." The daughter had gone through a number of legitimate pregnancies and probably was tired. Mitchell recommended champagne and a maid to assist her in her toilet. Her mother, a temperance worker (and few women can be stronger crusaders than a temperance leader from Maine) considered that the champagne was not only unnecessary but harmful, while a maid for her daughter's toilet was quite superfluous. Any well-trained New England husband was thoroughly capable of helping his wife in such intimate details (7).

Two letters from the Trent Collection now follow: the first one from a skeptical professional associate in London. Sir William Richard Gowers, distinguished British neurologist and well-qualified to discuss neurological mal-

adies, was unconvinced of the ultimate value of the rest cure (3).

50 Queen Anne Street
Cavendish Square, W.
February 21, 1882.

Dear Dr. Weir Mitchell,

I have asked Churchill to send you a copy of "Epilepsy" and I dare say it will be with you almost as soon as this note. If you think that it deserves to be known in America I should be very glad if you could give any publisher a recommendation to take it up. It has been offered to several who will not have anything to do with it and now Churchill has written to Wood of New York to ask him if he is inclined to introduce it in America.

I should like to see you here in August, but I am inclined to agree with you about your method being in danger of being overdone. Cases are being put to bed for trivial hysterical ailments and without the rubbing too! I am afraid there will be a good deal of this, for the rubbing is not always forthcoming with trouble and expense and a method is always likely to be half-done, its easiest half only being adopted, and patients simply put to bed with results which you know only too well.

If there is anything more in your paper on sleep disorders in the Virginia Medical Monthly than you give in your book, I should much like to see it.

With kind regards.

Sincerely Yours,
W. R. Gowers

The second letter contains an offer of a handsome sum of money to be spent by Mitchell according to his judgment (3).

Dear Doctor Mitchell,

I wish to make some testimonial to the value of your great work in this world—some recognition of the peculiar blessing you have conferred upon sufferers everywhere—especially upon those suffering with obscure nervous disease—so hard to bear, so difficult to treat—so little understood.

And I desire to offer a tribute, in common with so many others, to your generous heart, and gifted mind—to your high character as a man and a physician.

And I wish to contribute, upon *certain conditions* ten thousand dollars toward the advancement of your project for the benefit of nervous women. This sum to be subject to your control and disposal.

Very Sincerely Yours,
N. F. McCormick
Philadelphia
May 5, 1885

At one time during the War between the States there were more than 25,000 hospital beds for soldiers in the Philadelphia area. Although Mitchell was not commissioned in the Army, he devoted much time and effort to the care of the wounded. This provided an opportunity to develop a deep interest in nerve disorders from the battlefields. A small hospital unit was created initially by the Surgeon General, and later a 200-bed hospital on Turner's Lane was founded for Mitchell. Keen and Da Costa were associates in this hospital. Atropine was first used hypodermically here for muscle spasms. Thousands of pages of notes were taken in longhand by Mitchell on the cases under his care. He was a prodigious documentor before the development of the dictating machine and the general use of the modern typewriter.

Responsibility for the nerve injury cases forced Mitchell to devote more and more of his efforts to clinical neurology. Mitchell's investigations in physiology and neurophysiology were invaluable for such studies. Investigations of aberration of cutaneous sensations in patients with nerve injuries were expanded and elaborated by Head and Rivers in subsequent years, which led to the principles of protopathic and epicritic sensation. In a letter of January 20, 1906, Sir Henry Head praised Mitchell's nerve-injuries volume (3).

143 Harley Street W.

Dear Dr. Weir Mitchell,

I cannot tell you with what pleasure I received your kind letter. For, of all the books in my work-room, the one most marked and read is your wonderful work on "Injuries to Nerves." Dr. Hughlings Jackson once offered to lend me his copy, when I was a senior student at Queen Square: I answered eagerly, "I have one of my own": to which he responded, "you are greatly to be congratulated for you possess a mine of neurological wealth." So your book has been my companion for fifteen years and never more closely than during the time we have been working on our paper.

With kindest regards and many thanks, I am

Very Truly Yours,
Henry Head

A study of the "Tendon-Jerk and Muscle-jerk in disease," with Morris J. Lewis as co-author, was cited as the first sound piece of clinical research to be presented before the Association of American Physicians at its first

meeting held in Washington in 1886. Decussation of fibers for heat, and fatigue of nerve cells from initiative stimuli were also important contributions to neurophysiology. Mitchell was a founding member of the American Physiological Society. His studies in neuropsychology made him an intellectual equal of Duchenne and Charcot. In 1870, he was instrumental in establishing the Infirmary for Nervous Diseases which later became the Orthopaedic Hospital and Infirmary for Nervous Diseases. William Osler served on the visiting staff of this hospital during his Philadelphia tour of duty.

Several letters from Brown-Séquard, while practicing in London, discussed manuscripts for the recently established *Journal of Physiology of Man and Animals* (in French) (3).

July 20, 1861

My Dear Sir:

I hope you will excuse my writing to you an almost illegible letter. Life in London for a busy consulting physician is such a frightful thing that I have hardly time for sleep, to eat, to talk with friends, or to write long answers to any letter.

I am very happy to see that you do so much for physiology, and I congratulate you sincerely for the advances this noble science owes to you already. You and your friend and scientific partner, Dr. Hammond, are the most original physiologists of the United States.

As regards your question concerning the publication of your papers in my journal, I have no hesitation in saying that it would be a very great advantage for the journal to publish your papers *in French*. But I cannot unfortunately give papers in the English language, as most of my subscribers in France have been very much displeased again on account of the publication of Richardson's paper *in English*.

I will be very glad if you like it so, to have original papers from you and I will have them translated and publish them in French, if they are not very long.

I am sorry not to have received yet your paper on the venom of the rattlesnake.

Believe me, dear sir, with high regard,

Yours Very Truly,
C. E. Brown-Séquard

* * *

25 Cavendish Square
London
February 7, 1862

My Dear Sir:

Your paper reached me three days ago. I corrected it at once and put it in purer French and it is now in the hands of the printer. It will appear in about a fortnight. I am much obliged to you.

Please excuse the shortness of this note. I have hardly time to breathe here, so extensive (Alas!) is my practice. I hope, however, to be soon able to give up a part of this practice and devote one half of my time to science.

I am glad to see that you are constantly at work for science. The state of America is such that it seems difficult to realize how anything except fighting can be done there. I hope, however, that soon the rebellion will be crushed.

Believe me, dear sir,

Yours Very Faithfully,
C. E. Brown-Séquard

One of the last letters from Brown-Séquard concerned his rejuvenation studies by hormones and a reply to a request for rare chemical compounds (3).

19, Rue Francois I
Paris
November 5, 1893

My Dear Mitchell,

Had you applied 6 months ago I could have sent you any of the various kinds of organic liquids prepared at my laboratory, and in any quantity. At present, unfortunately, it is impossible to send you even a vial of 30 grammes.

Professor D'Arsonval, my assistant, in whom alone I have confidence for the preparation of these liquids, is and has been for 3 months away from Paris. I cannot, therefore, give you what you wish. I send you a circular which will show you that we have ceased to give organic liquids since June last.

It is so easy, with one of D'Arsonval's various apparatuses, to prepare the organic liquids that you certainly could have them without difficulty.

I should like you to employ the orchitic liquid for yourself. The absurd ideas that liquid restores youth belong to the daily political and literary press and not to me. The name of elixir of Life also belongs to daily papers. I never made use of it except to criticize it.

What is certain is that although the wheel of my life is constantly rolling towards its natural (or some other) termination, I am, now, after five years use of the orchitic liquid, able to work physically and mentally any length of time (often a whole day) without feeling the least fatigue. I am 76 years old, as I was born the 8th of April 1817.

I will soon send you a few reprints, which may interest you.

Believe me, Dear Dr. Mitchell,

Yours Faithfully,
C. E. Brown-Séquard

Other correspondents of Mitchell included John Greenleaf Whittier, Owen Wister, Phillips Brooks, James Russell Lowell, James Whitcomb Riley, William Pepper, Edgar Allan Poe, John Hay, Ronald Ross, William James, Elihu Root (who believed for a few hours that he had won the election for the presidency of the United States), Andrew Carnegie, Charles Dickens, Leonard Wood, Booker T. Washington, Alfred Lord Tennyson, James Paget, George Meredith, and Abraham Jacobi.

In one of Mitchell's letters to Osler, when the latter was at Oxford, he noted that there was nothing new in science in the United States except the amazing story that after John D. Rockefeller had given Dr. Paul Ehrlich $10,000 per year for three years, someone left the German scientist a million marks. Following this legacy, Ehrlich wrote to Mr. Rockefeller that he no longer was in need of the oil-man's financial graciousness and that he did not know how best he could show his appreciation, but finally concluded to send Mr. Rockefeller 1,000 doses of "606."

The College of Physicians of Philadelphia probably owes more to Mitchell than to any other physician. He was elected a fellow of the College in 1856, became its president thirty years later, and was re-elected president in the following years. At the Centennial of the College in 1887, according to Mitchell the oldest, non-state, medical society in America, Mitchell reiterated the words of Dr. John Redman, president a century earlier, as he gazed at the portraits about the hall of so many "gentlemen of character for learning, ingenuity and integrity in the profession and practice of physic, and whose dignity in the medical line, and who have conducted therein for many years so much to their own reputation, and to the advancement and satisfaction of their pupils and of their fellow citizens" (8). He noted further that the history of any profession, as a function of the progress and growth of a new land, is of profound interest, and, probably more important, the position of the practicing physician in any community is a reliable test of its good sense. There was no calling or profession in Mitchell's day that provided greater stature in the community. There was always open to the physician the opportunities for social position, intellectual integrity, service to the government, and financial substance. The difference in careers that led to prominence in the communities along the eastern seaboard a century ago was apparent. In New England, the clergy were the leaders; in New York, commercial success led to community prestige; in the south, it was the landholder, but in Philadelphia, the physician was the outstanding citizen and held an unquestioned and somewhat curious pre-eminence.

Particular credit was given to the friends and co-religionists of William Penn for directing to this area physicians or families from which physicians were born. It was noted that Edward Jones, surgeon, came over in 1682; his father-in-law, Thomas Wynne, came with Penn. Others were Thomas Lloyd, Griffith Owens, Lloyd Zachary, Thomas Graeme, the two Bonds, Moore and Cadwalader. Each was a member of the Society of Friends, except for Graeme, who was a member of the Church of England. They brought with them, "the tastes, manners, and education of gentlemen, and to its completeness, high-minded sense of duty."

Mitchell describes the first meeting of this College held by the dim light of candles. Some were there in Quaker dress; whereas others were in knee breeches, silk stockings, and low shoes with buckles. Possibly a few carried a gold-headed cane and the meditative snuff-box. Some wore queues or powdered wigs, a fading fashion. A number of physicians (some whose portraits we see in this room) were present: John Jones, William Shippen, Jr., Adam Kuhn, Benjamin Rush, Thomas Parke, Gerardus Clarkson, Samuel Duffield, James Hutchinson, William W. Smith, Andrew Ross, William Clarkson, James Hall, and William Currie. The full roll of fellows and junior fellows included also the familiar names of John Redman, John Morgan, Caspar Wistar, Jr., and John H. Gibbons. They were friends and physicians of Washington, Franklin, Hamilton,

Jefferson, and Adams. The best of them were educated at Edinburgh. Genealogically, this College and the University of Pennsylvania are considered children of Edinburgh and grandchildren of Leyden.

Dr. Mitchell attracted many friends at home and abroad. As a trustee of the University of Pennsylvania he was instrumental in inducing Osler to accept the chair of clinical medicine in Philadelphia, where the latter remained for five years, on his way to Baltimore and Oxford. This College has been judged Osler's most cherished institution in Philadelphia. The friendship between Osler and Mitchell seems as lasting and deep as between any friends of either physician. Osler, in 1890, presented Mitchell's portrait to the College. When Mitchell was on the Library Committee, after Osler moved to Oxford, the Regius Professor urged the library to procure a copy of the first printed edition (1478) of Celsus. Osler gave $25 of the $400 necessary to purchase this volume, with the admonition to Mitchell to "bleed the fellows for the rest." Mitchell promptly "phlebotomized" a sufficient number of fellows to purchase the book, which is in your rare book collection. An additional feature of this copy is that it bears the ownership inscription of Giorgio Antonio Vespucci, uncle of Amerigo—for whom America was named.

Mitchell received honorary degrees from the Universities of Harvard, Princeton, Pennsylvania, Edinburgh, Bologna, Toronto, Johns Hopkins, and Jefferson Medical College. He was a delegate to the American Medical Association meeting in 1880, and president of the Association of American Physicians in 1887.

He was induced to give the Phi Beta Kappa oration at Harvard, as the following letter attests (3):

709 Exchange Bldg.
Boston
October 30, 1893

Dr. S. Weir Mitchell
Dear Sir,

By vote of the literary committee of the Phi Beta Kappa Society of Harvard College, I am directed to invite you to deliver the oration before the Society at its annual meeting in Cambridge on June 29, 1894.

Within the last twenty years these orations have been delivered by President Walker of the Massachusetts Institute of Technology, President Tucker of Dartmouth College, President Eliot of Harvard College, Bishop Potter, Professor W. W. Goodwine of Harvard, Hon. E. J. Phelps, Professor R. C. Jebb of Cambridge University, Hon. T. F. Bayard, Hon. Carl Schurz, and others.

Sincerely hoping that you may be able to accept our invitation, I am

Very truly Yours,
Francis C. Lowell
Chairman

Although Mitchell had published poems or verse since his youth, a transition from medicine to literature, which became apparent in the 1880's, was completed in the waning years of the 19th century. His first published article was a poem in 1846; his last published manuscript, in 1914, was a description of the medical department in the Civil War. He followed the advice of Oliver Wendell Holmes in making sure of his career in medicine before launching into literature. The dedicatory epistle to O. W. H. in his "The Cup of Youth and Other Poems," published in 1889, reflects this advice (9).

When I was a young man your kindly advice kept me from inflicting a volume of verse on the public, by which it would have not been profitable and by which I should assuredly have been injured.

Accept this dedication as in some shape the expression of my thanks for that valuable service, which, with the many kindnesses, I owe to your friendship, has no doubt long since slipped out of your memory.

A great deal of Mitchell's medical philosophy, as well as his insight into human behavior, found an outlet in his novels. They stand high in American literature of the 19th century. The literary journals of his time, *The Atlantic Monthly*, *Century*, *Harper's*, and *Scribner's*, published his poems and prose. His pattern of publishing was unusual. The first copy would be printed from a lightly corrected draft written in longhand. In some instances four or five printings would be made before the final copy suited the author. He preferred to make corrections on a printed

copy rather than on the first longhand or typed copy.

The preparation of a poem was quite different from the preparation of prose (1).

I wish to put on paper the process by which a poem originates in my mind. It is carried to such completion as I am capable of. I do not know what others say about this. First, there is the belief that certain things can be better said in verse than in prose. That that is said competently in verse means the higher thoughts in the best form and the most condensed English. Also I state my belief that a man who can write in the language of poetry must as soon as he begins to deal poetically with a subject, think in rhythms. At least that is my own case. The moment the thoughts begin to assume form, they assume rhythmic form. The choice of forms of rhythms I find difficult to state reasons. Sometimes one gets caught in a rhythm not suited to the subject, or, as did Browning, misses the best form, but as a rule one finds a right rhythmic thought with which to develop ideas.

One of his great sorrows was the death of his daughter, Maria, of diphtheria, at the age of 22. In his grief he composed the "Ode to a Lycian Tomb", from a tomb seen in a museum in Istanbul:

Cold mourner, set in stone so long ago
Too much my thoughts have dwelt with thee apart,
Again my grief is young, full well I know
The pang re-born that mocks my feeble art
With that too human wail and pain expressed,
The parent cry above the empty nest!

Augustus St. Gaudens, busy though he was, was persuaded to sculpt a bas-relief in marble, "Angel of Purity," in memory of Maria. It may be seen to the left of the reredos in St. Stephen's Episcopal Church on South 10th Street. The same St. Gaudens had previously done a bronze plaque of Dr. Mitchell that remains privately owned.

Composition of a poem in honor of a friend was a gladly accepted task. Mitchell was poet to D. Hayes Agnew, William Osler, William H. Welch, Abraham Jacobi, and Oliver W. Holmes. These tributes were written in quatrain or rhymed couplets. Miscellaneous poetic forms included versification, blank verse, five-line stanzas, six-line stanzas, seven-line stanzas, ten-line stanzas, and sonnets.

At a dinner of the Charaka Club in New York in 1905, Mitchell read a poem to Osler in commemoration of his friend's departure for Oxford:

Show me his friends, and I the man shall know;
This wiser turn a larger wisdom lends:
Show me the books he loves, and I shall know
The man far better than through mortal friends.

Do you perchance recall when first we met,
And gayly winged with thought the flying night,
And won with ease the friendship of the mind?
I like to call it friendship at first sight.

And then you found with us a second home,
And, in the practice of life's happiest art,
You little guessed how readily you won
The added friendship of the open heart.

Mitchell was a fine money-raiser. A letter about Andrew Carnegie records the result of a successful financial campaign (3).

January 6, 1903

Dear Dr. Mitchell:

I know you will be glad to hear that I have this morning received Mr. Carnegie's written donation of one million and a half dollars for the branch libraries. This is a munificent sum and I cannot be too grateful to you for what you said to Mr. Carnegie about me and about the library, and to Mr. Carnegie for setting our branch system on such a splendid footing.

I hardly know whether the delightful way in which Mr. Carnegie made the offer to me to present this sum or the largeness of his gift deserves best remembrance. As I said to him when parting, I hoped he might find as much pleasure in watching our progress as he had shown in providing us with the means to accomplish the development now in view.

Many and many thanks to you for what you have said and done.

Yours Truly,
John Thomson

William H. Welch described Weir Mitchell as, "a great physician, our leader, endeared and admired, friend and counselor, generous, wise, inspiring, a man of singular graces and accomplishments, active in advancing knowledge and good work, a poet and a man of letters, a sweetness of life to sick and well. He represented all that is best in the physician and gentleman."

Mitchell did not fear death as his final days

grew near, but he did dread pain and a long slow descent. He died of pneumonia on January 4, 1914, and his wife followed him nine days later. In his youth, he was a leading physiologist, and matured as an outstanding physician, the father of American Neurology, psychiatrist, novelist, and poet. His death found him abundant in years and abundant with honors. The S. Weir Mitchell Associates is now another device among many to perpetuate his memory in Philadelphia and in the medical world. His poem, "Vesperal", composed in 1889, concludes my tribute (10).

I know the night is near at hand,
The mists lie low on hill and bay,
The autumn sheaves are dewless, dry;
But I have had the day.

Yes, I have had, dear Lord, the day;
When at Thy call I have the night,
Brief be the twilight as I pass
From light to dark, from dark to light.

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Widening Health Horizons[1]

By LEONA BAUMGARTNER, PH.D., M.D.[2]

IT IS a profound honor for me to give the James M. Anders Lecture and to address this venerable and vigorous society. You constitute an organism that has come a long way since its beginning two years before the Constitution of the United States went into effect.

The College of Physicians of Philadelphia, as you know, was organized in the days of yellow fever in this city, in the epoch of massive doses of calomel and jalap. It was founded at a time when doctors were somewhat secretive about their techniques, prescriptions and instruments, when the great battle against infectious disease was beginning with the attack on small pox. It was a period of doctors on horseback, and of patients in their homes. There were few hospitals, and patients of means generally did not wish to be treated in those that existed. It was a day when, although the scientific armamentarium of the doctor left much to be desired, his relationship to his patient was direct, and, as we look back, rather wonderful. The doctor was the real center of medical care. He was the person that the patient called in time of need, and the person who solved or failed to solve the patient's medical problems. He used his own equipment, brought his own drugs, and usually relied entirely on his own judgment. His role had a simplicity that we lack today.

A brief look at that era is enough to make us realize how times have changed, and how the doctor's relationship to his environment, and the environment itself, has been altered. The doctor has affected the environment, moreover, for in serving his patients he has pushed forward the life expectancy. His work against infectious disease has made possible patterns of living that would have been impossible in the 18th century. The doctor has accomplished much and changed much, not generally through planning, but by shifting to meet new problems as they have arisen. His influence on overall health planning might, indeed, have been more effective, but he is still here, still curious, imaginative, dissatisfied with the methods he has, determined that tomorrow's methods shall be improved.

Much of the change that has taken place, of course, has been in the general shape of our nation and the world. When this College was founded, Philadelphia was not very far from the western frontier. Now that geographical frontier is gone, and the whole world touches us and communicates with us. Changes in ways of living, as much as changes in medicine itself, have affected the practice of medicine. What we doctors do partakes of the coloration of the society in which we function. As civilization moves, it affects each of us. Sometimes, when living standards rise, our jobs are made easier in some ways. When men brew their own problems, such as air and water pollution, atomic bombs and cigarette smoke, our jobs become harder and we have new demons to joust with.

The Patient Looks at Medical Care

The seeds of some of today's thinking in medicine could be found in the views of many early doctors. Dr. John Redman, the first president of this college, thought not only of his patients when they were sick, but also when they were well. It is recorded that he visited his patients two or three times a year, even when they were apparently in good health. He had a feeling for preventive medicine and what is now called 'health maintenance'.

[1] James M. Anders Lecture XLII, College of Physicians of Philadelphia, 7 November 1962.

[2] Assistant Administrator, Agency for International Development, Department of State, Washington 25, D. C.

The patient in Redman's day looked in one direction for medical care. He looked to the doctor. It is true that he may have been taken in by some of the outrageous advertising for home remedies in that era. It seems hard to believe, but the situation was worse even than the fast—fast—fast relief nostrums of today. Nevertheless, when the patient of that day really needed help, he called on his doctor, if he had one.

If he was fortunate, he looked to the particular doctor with whom he had previous contact. The relationship was close. The doctor was not only a medical man, but he was a highly respected force in the community. Particularly in frontier or near-frontier areas, the doctor may well have been the only professional man to visit the home, outside of the clergyman. He was respected for his learning and so was asked all kinds of advice, from that relating to purely medical problems to the question of whether the home should be sold or new land added to the farm. He had a stature in the patient's mind then that he has now often lost. It is interesting that he has lost it, perhaps in part, because he can obviously do much more in his job—that of healing the sick—than he could in those early years.

When the patient looks at medicine today he sees a different picture. There are many Americans who have no family doctor, and these persons face a complicated line of clinics, hospitals, care centers, referral units and agencies. Those who have family doctors often see a scarcely less bewildering picture. They cling to the ancient idea of the family physician, but they find that he has almost disappeared. Across the land, house calls are declining—almost to the point of extinction in some places. The mobility of our citizens, moreover, makes the old family doctor for a lifetime impossible in most circumstances. The patient, therefore, goes to an unfamiliar doctor's office, with its ominous rows of books on rather unpleasant subjects. Or the patient goes to the hospital, where the physician visits him against a background of clinical noises and smells.

If the patient's problem is one for which science has a ready answer, he is apt to get an injection of penicillin—a drug that in its simplicity of administration and effectiveness of action has all but drained human contact from the treatment of certain ailments. The patient feels sick and wants care, with all the attention that word implies, and he gets a sudden jab in the arm that may well cure him, but leaves him strangely unsatisfied emotionally.

If the patient's problem is more complex, he finds himself caught in the toils of our tangled apparatus for the delivery of medical care. He is often referred to a specialist. He usually does not know the specialist and the specialist does not know him. The encounter, under the cloud of illness, is apt to be rather curt and formal. The patient listens to the stranger and discovers that his body has been administratively divided into separate pieces, and that even the separate pieces are further subdivided. For each subdivision there is a specialist waiting somewhere—surrounded by more grim books and gadgets, by equipment that feels icy to the skin—waiting to discuss one particular cluster of molecules in his anatomy, to the almost complete exclusion of the others. This is depressing to the patient, because although he may not know the exact function of all his subdivisions, he's in favor of them, all of them, and foolishly thinks of them as forming one unit, which is *him*.

If he has a heart condition, he finds that even his circulatory system, which he may unreasonably have thought was all of a piece, is considered as an assortment of seemingly unrelated parts, around each of which has grown a welter of opinion, a towering pile of literature, and a group of experts who appear to see with blinding clarity in one precise direction. If the patient persists and goes to enough specialists, he may find himself favored with a group of varying diagnoses, each buttressed with complicated scientific explanations he does not understand.

Along his rocky road the patient finds that he is tested and retested, often for the same thing. His doctor may send him to a radiologist for x-ray study. But if he subsequently enters a hospital the x-ray pictures, more often than not, will be taken all over again. If he does require hospitalization, the patient may dare the thought that he will be allowed to go to a hospital he knows, from which he may possibly look out the window at a friendly scene. But his hopes are dashed. He has been like the football in a forward pass, and is now firmly in the grip of an end runner who plants him in a hospital he knows nothing about. He lies inert, tended by what he comes to think of as highly imperfect strangers. In the jargon of the hospital he is often referred to by the number of his bed or his room, or, if he has a fascinating disease, by the bleak title of that entity.

He does not know what will be done for him or where he is going. The doctor he started with seems to have faded out of the picture. The patient does know one thing: it is all tremendously expensive.

The Patient as a Physician

Many medical decisions must be made by the patient himself. This is not entirely new. It has been going on since someone started advertising drugs or regimens the patient could use himself. Yet it seems to me that today's age beats all others in the way the patient is pressured into making key decisions on medical matters. The wonder is that he makes so many of them so well!

Doctors are urged by recognized authorities to give preventive vaccine for poliomyelitis. But the matter does not stop there. Patients are also urged to take such vaccines. They certainly should be. But some of the decision-making prerogative has been shifted from the doctor to the layman. The question is not just one involving vaccines. Increasingly the patient reads about a certain drug and asks his doctor to administer it to him. The doctor can refuse, but it would be fascinating to actually know how often the patient gets his way.

When patients receive conflicting opinions from a group of specialists, it is often the patient who has to decide which opinion to accept, and consequently which line of treatment to follow. He is influenced in these matters by whatever medical information and folklore he has previously absorbed.

What background medical knowledge the layman has is thus of importance. He may, of course, be legally required to approve surgery for himself or a close relative, but this is not the chief problem. One must consider his point of view, for example, when such a disease as rheumatoid arthritis is involved. Here, if we are to help him, he must usually accept a long, hard regimen. He must really do much more than accept it; he must cooperate wholeheartedly in it. If we had a single wonder drug that would cure him, it would probably be relatively easy to convince him to take it and await the dramatic result. What we are able to offer, while effective, is not dramatic. It takes persuasion to get the patient to follow our advice, and his basic background of medical knowledge will be important in his decision.

Not only does the patient-layman decide about medical matters pertaining to himself or his relatives, he is increasingly a voice in charting medical programs that affect very large groups. He sits on hospital boards, he is present in Congress, he votes in referendums. Laymen, voting in referendums, have defeated fluoridation of water supplies to prevent dental caries in a number of places in the United States. And studies have shown that the individual voting against such fluoridation is less likely to have sound scientific background and harbors a less favorable attitude toward science in general than the person voting for fluoridation.

Certainly the layman is an important part of medicine today, and what we can teach him about basic scientific concepts will have a great deal to do with how he acts or votes when the time comes for decision.

The Physician Looks at Medical Care

The physician sees the panorama of medical care from a different point of view than the patient, but he sees many of the same things. If he is a specialist, as more and more physicians are now, he, too, may miss the traditional relationship with his patient. He is dependent on referrals. A substantial amount of his work is on a one-shot basis.

If he is in general practice and his patient needs the facilities of a certain hospital, he knows he will lose that patient. This is a serious matter. In New York City, for example, special children's cardiac evaluation centers had to be established. They were set up because physicians, reluctant to lose their patients, resisted sending them to the few large hospitals that had the facilities they required.

The practicing physician whose patient is referred to a specialist may lose his patient temporarily and receive him back later. But he receives him back in different condition. The patient may have been to a hospital for surgery, but he may return without a solitary note as to what has been done to him. Doctors are sometimes reduced to asking patients what color pills they were given six months ago by somebody else—in an effort to elucidate facts that should have been clearly recorded. Medical records rarely travel with patients, and prying them out of hospitals, at least with any speed, is a frustration we have all experienced.

The physician wants to do for his patient the best that is possible at this time of rapid scientific progress. To do this he must use the products of modern medical technology. He well knows that he and his little black bag, if he still has one, often cannot do the full job. He has to have the full gamut of services, from electroencephalography to isotope tracers, from rehabilitation center to nursing home, from pathology to virus laboratory. He may not know the full list of services that are available or where they are. In my view, it is a function of health officers not only to provide some leadership in bringing together the fragments of our medical care system, but also in making sure that all practitioners who must use it know what and where the parts are.

Money and Some of the Roots of Evil

The amount of money the American people pay for health is so enormous that it is practically beyond understanding. It has reached $25 billion a year, a sum considerably larger than our entire gold reserve.

Some of this fantastic outlay is spent on research, a great deal on hospitals, some on doctors, some on quacks, some on drugs, and some on home remedies of various sorts. It is so large a sum and it is rising so fast that a number of informed persons have questioned whether—if what we buy with this money represents what we want—we can long afford it.

There is no doubt that many individuals cannot now afford the care they need and do not receive it. We also know that serious illness, especially chronic illness, can reduce a completely self-sufficient family to destitution in a surprisingly brief period. When this happens, problems arise beyond the traditional field of medicine. A family that goes from self-sufficiency to destitution suffers a major emotional trauma, and in addition becomes a burden on society. Sickness and its cost already constitute a major reason for persons going on financial relief. The direct and indirect costs of persons on public assistance are enormous, and the problems created are not solved by subsistence payments, although these are necessary. A destitute and unproductive family represents a drain on us all.

It is now open season on the subject of paying for medical care. It seems that almost everyone is asking for the floor, and the air thunders with opinions. In concentrating on how the money is to be obtained, and to whom it is to be paid, and under what circumstances, we have sometimes allowed our attention to what we get for the money to fade.

It is true that the way money is spent does affect the quality of medical care. A governmental unit that insists on the best when it

buys medical care services does influence the overall care generally available in an area. A health insurance plan that covers tests and examinations only if the patient is actually in a hospital obviously influences the quality of care.

But we are doctors, and our competence is in medicine, not economics. It is distressing to see some persons paying more attention to the details of money-gathering than to what the money spent buys in the way of medical care for the American people.

Fragmentation and Its Problems

If our present system for delivering medical care is inadequate, as it often appears to be, the trouble does not lie in its having been created by villains. The trouble is that it just grew, over a long period, almost entirely without planning, and to meet the needs of a different era. So much more is now available and feasible for the individual citizen than a generation ago.

The situation reminds me of a man building a house. He starts with a couple of rooms and a heating system, and all is fine. But as years go by, his needs and interests change, and he builds extra rooms, adding them on here and there. He adds a nursery when he wants that, and a den, and extra bedrooms and porches, and perhaps a music room and a workshop. The individual rooms are first-rate and the roof does not leak, but it becomes a long haul from one end of the place to the other. Its heating system is strained, and taken all together it doesn't make much sense. It will be hard to sell, and if a buyer is found he will find it difficult to live in and extremely costly to maintain. The medical care delivery system we now have resembles such a rambling, rococo edifice, replete with waste and duplication, and unsuited to the needs of our day. Nobody would design it the way it is, if we were to start from scratch: neither the radicals nor the conservatives, but it has crystallized and is hard to change.

Built largely during a past era of emphasis upon acute illness, what we have is unsuitable for the health problems of today, and particularly the problems of chronic illness. We find an assortment of separate agencies steaming ahead in splendid isolation, often paying scant attention to the overall need, and frightened of planning because it might lead to loss of sovereignty. In New York City, for example, it takes a large book simply to list and describe the agencies and units involved in health in one way or another. I should imagine the Philadelphia story is a similar one.

It is not unusual for a sick person to be involved in one way or another with private practice, with state and local agencies, with the federal government, and with a voluntary agency, all in the course of a single illness. Each of these groups has its own splendid set of rules, and save for a few pilot projects there is little coordination between them. One sick person may have to go to as many as six different clinics, and, as Dr. George James observes, "The travel and time consumed may present him with difficulties at least as great as his medical disorders. They, more than his illness, may result in the end of his self sufficiency, and in his institutionalization."

It would be wrong, of course, to present a picture of only the deficiencies of our medical care delivery system. There are many bright spots. There are communities where hospitals have looked beyond their walls and have cooperated with each other in sharing the total need. There are places where homemaker services have made it possible for persons to be cared for at home, or for them to go to clinics confident that someone was caring for the children at home. The problems we face are so overwhelming, however, that there is ferment in many sectors of society to get on with the job.

In New York City there are a number of demonstration medical care projects, not just to try new organizational ideas but to evaluate on a continuing basis what is being accomplished and what are the strong and weak points of pilot programs.

In one such effort a number of agencies, ranging from a voluntary group to the City

Health Department, are attempting a health maintenence program among a large number of older persons living in a low-income housing project. Through cooperation between the local people and the federal government a clinic has been established in the project, and a nearby hospital is participating. This is an effort to detect disease in older persons and to treat it before these individuals become so ill they have to be admitted to a hospital or are otherwise withdrawn from the mainstream of life. This is research of a sort. The number of people involved is not large compared to the population of the city, but the amount of information to be elicited should be great. Already it is obvious that when the representatives of five or six agencies sit down together and concentrate on the problem at hand, on the human beings that need help, various agency rules and regulations appear to fade into the background, and the problem itself, and attempts at its solution, take the foreground.

In another project, 1,000 families on public assistance are receiving all their medical care through the New York Hospital. This is a cooperative project involving the hospital, the local departments of health, hospitals and welfare, and the Cornell University Medical College. Care in nursing homes and homemaker services are included, and the program includes care in the home, office and hospital. Another group of 1,000 persons, receiving care in the usual manner, are serving as controls for the study. From this project will be learned much about difference in quality of care, about the practicality of the arrangement and about its cost. One straw in the wind is that those who are served by this program are already making fewer requests for home visits by physicians than they did before.

Widening Health Horizons

We widen our horizons by not accepting what we used to accept. Many years ago it was accepted that a large part of the population would contract smallpox at some time or other; we do not accept that thesis now. A few years ago we accepted—most of us—that little could be done about the victims of stroke. Now, with advances in rehabilitation, we are beginning not to accept this. Stroke victims are being rehabilitated and returned to productive life. Today there is acceptance of the fact that although the best in American medical care is magnificent, there are many who do not receive it. Tomorrow, I am convinced, we will no longer accept this. Today we accept the fragmentation of our medical care system, and we accept the autonomy of hospitals, agencies, health units of one kind or another. Tomorrow, with our problems magnified, the public may be unwilling to accept this situation.

The widening of health horizons so far as physicians are concerned inevitably involves an interest in the organization of medical care delivery methods, and a recognition that administrative problems—fragmentation or what you will—can keep a patient from what he needs just as surely as though it had not been invented. For example, we as physicians are reluctant to think in terms of mass communication. But if a lack of communication, a lack of knowing how to do it, results in substantial numbers of people not presenting themselves for polio vaccination, then communication does become a medical matter, and we must concern ourselves with it. If there is a wholly unnecessary toll of lives (and expediture of money) because of cancer of the uterine cervix, which could easily be detected in time, then we as physicians must be concerned with why women do not present themselves for examination, and with means for inducing them to do so. If a woman does not go to a clinic for medical care because she has no one to leave with the children at home, we may consider this as much a part of medicine as our instruments and drugs. The magnificent scientific advances of the laboratory are of zero value if they are not somehow brought to the patient who needs them. Very often they are not, and we doctors have got to consider this delivery of service as much a part of our business as any other part of medicine. We

must show leadership. If we do not, tomorrow's organization of medical care will not be designed by doctors. Doctors will simply find themselves stuck with a scheme which they did not devise.

We have arrived at a time when we must look carefully at the physician. We must look at a man who keeps up as best he can with the torrent of professional literature, who goes to postgraduate courses, who does everything he can for his patients, who gives time on the wards of a hospital, who is diligent, thoughtful, expert. We must look at this man today, and say: no, he is not the future physician, for he must widen his vision to include this new horizon in medicine. I, for one, think he will.

In closing, may I point to another widening horizon for American Medicine. Because of the widening horizons of all nations, and our own in particular, we are coming to realize that the security and continuing progress for our way of life seems dependent on the abilities of other countries to develop free and independent societies—and to control the forces that might destroy mankind.

Ultimately, what happens to everyone else in the world is of concern to us. Rapid communication and transportation have brought the world to our attention. This widening interest in what goes on elsewhere has created an enormous demand on the part of the so-called emerging nations—the 'have-nots'—for the science and technology, for the freedom from hunger, want, and misery enjoyed by the 'have' nations. This widening interest is attracting thousands of Americans abroad, not as tourists but as new kinds of missionary-pioneers.

But the problem of transplanting our expertese is turning out not to be as simple as the process initially seemed. These transplants are not necessarily viable. The beliefs, the values, the aspirations, the customs, the directions in which the economic and social development are moving—all have their influence on the viability of the transplant. The expertese may well have to be adapted to the terrain of the recipient country. The same innovation and creativity, the same scientific spirit of inquiry are needed in this process as were needed in developing the expertese which worked in our nation. A wise man does not plant willows in a desert!

This problem is of particular interest to this organization and the four Philadelphia medical schools which have recently embarked on an adventurous and exciting venture—that of helping build a medical school in a new African nation—Ghana. Another Philadelphia medical school is undertaking a similar venture in Iran. But doctors in neither Iran nor Ghana face the same problems—their patients have different diseases—some of the same ones the founders of this College treated almost 200 years ago. The economy, resources, and practices of the people are obviously not those of 1962 Philadelphia. More and more the leaders and the peoples of these countries are complaining that doctors trained in our medicine are not meeting their health needs. The trick is not to copy exactly what we have here, but to find what the major problems there are and tailor our scientific miracles to solve these problems. This is not to say that some cardiac surgeons, some sophisticated researchers in neurology or other specialities, should not be trained, but there must be a better balance of skills. Most of all, there must be an inquisitive spirit to seek the solutions for new problems. Let me remind you that our fine technology is not always able to supply adequate answers for the pressing problems which beg solution. As an example, look at the urgent problem of population control. Progress in this field is only in its infancy at present.

It is quite possible that as our best minds and our best workers tackle some of these tasks, they will stretch their own horizons in far-off places and come home to initiate some of the innovations we need here. The time for widening health horizons has come—at home and abroad.

Extinct Medical Schools of Nineteenth Century Philadelphia:

(III) The Franklin Medical College

By HAROLD J. ABRAHAMS, PH.D.

EVEN as the Biblical Rebecca gave the world two offspring,[1] one destined to eclipse the other, the Philadelphia School of Anatomy's western room gave birth to Dr. McClintock's Philadelphia College of Medicine, chartered in 1847, while its eastern room probably produced the Franklin College of Medicine, chartered about one year earlier. In "the days of [its] years" the former college overshadowed the latter.

Dr. Nathaniel Chapman,[2] whose ancestors were related to Sir Walter Raleigh, was a Virginian of great ability, personal magnetism, wit, humor and charm. It has been written of him that, after Physick, "he was the acknowledged head of the American profession." He was one of the founders of a scheme for improving medical instruction by giving his private pupils the advantages which would accrue to them by his associating himself with other preceptors of semi-specialist nature. Thus, Dr. Chapman was a prime-mover in the effort to produce a more thorough system of private medical education, so characteristic of Philadelphia at that time. He began his activities in 1817, and in ten years his "Medical Institute" was giving a "systematic and popular course of instruction," of almost the entire year's duration, more than one hundred students being enrolled. There were two terms, the first devoted mostly to lectures and the second to examinations, which may have evolved into the locally-famous "quiz" system. Such extra-mural courses became a splendid training ground for students and professors alike. The rapid growth of Chapman's "Medical Institute" necessitated a fitting home, which was built on Locust Street above Eleventh.

I. BUILDING AND EQUIPMENT

It was this building, twenty years old at the time,[3] which the Franklin Medical College took over, upon its being chartered on January 28, 1846.[4] (For a long time the University of Pennsylvania had been holding its summer sessions there.) Improvements in the building were made, and a fourth story, to be used for practical anatomy, was planned for completion in early summer. There were three spacious

[1] Genesis: 25. The Philadelphia College of Medicine was the subject of the preceding article in this series on Extinct Medical Schools of Nineteenth Century Philadelphia.

[2] Dr. Chapman's portrait, by Thomas Sully, hangs on the wall to the left of the approach to Mitchell Hall at the College of Physicians of Philadelphia. Nathaniel Chapman (1780–1853) was a private pupil of Dr. Benjamin Rush. After graduating in medicine from the University of Pennsylvania in 1800, he studied in London and Edinburgh for three years. In 1816, he succeeded Dr. Rush as Professor of the Practice of Medicine. In November 1820, he founded a new medical periodical, "The Philadelphia Journal of the Medical and Physical Sciences", which still lives as "The American Journal of the Medical Sciences."—the first permanent American medical periodical, and one of our greatest. Nathaniel Chapman was, "by acclamation", elected to serve as first president of the American Medical Association in 1847.

[3] The building was demolished in 1894 or 1895.

[4] Philadelphia, therefore, now had five regularly constituted medical schools. In justification for a fifth school in Philadelphia, the first *Announcement* expressed the opinion that the influx of persons who wished to study medicine here made mandatory such accommodation. The size of classes in the city's medical schools, said the *Announcement*, required limitation, if good instruction in the demonstrative branches of medicine were to result. The Faculty would aim to make the courses "essentially practical and demonstrative."

lecture rooms "besides the apartment destined for dissection." The location, within three squares of the Pennsylvania Hospital, was "agreeable and healthy," and every convenience and comfort were promised. The equipment included anatomical models, drawings and microscopic histological exhibitions, oxyhydrogen microscope, anatomical dissections, and preparations (to which Professor Goddard and his demonstrator, Dr. Leidy, were actively engaged "in making extensive and costly additions"); plates, enlarged drawings, models, manikins and various mechanical apparatus for illustrating the course in surgery; paintings, diagrams, pathological models, recent and prepared morbid specimens; painted figures and dried preparations of medicinal plants and fresh and growing plants, indigenous and foreign; an obstetrical cabinet rich in machines, models, and drawings; papier-maché models of uterus and foetus, preparations of bones of pelvis and foetal skeletons imported from France; apparatus for teaching general and organic chemistry, including specimens, both genuine and adulterated, copious experiments, diagrams, etc. Well-lighted and ventilated anatomical rooms, unusually commodious, comprised the entire upper story of the building, and there was cheap and abundant material for dissection, under the constant personal superintendence, lectures and demonstrations of Dr. Joseph Leidy, demonstrator of anatomy, and later Dr. Robert P. Thomas.

II. CURRICULUM

A. Anatomy and Histology
B. Principles and Practice of Surgery
C. Principles and Practice of Medicine, with emphasis upon physical diagnosis, particularly the application of auscultation, percussion, etc., to the diseases of the lungs, heart, and abdomen
D. Materia Medica and Therapeutics
E. Obstetrics and the Diseases of Women and Children
F. Physiology; Legal Medicine; Pathology
G. General and Organic Chemistry, with attention to the "imponderables" (heat, light, and electricity), chemical reaction, laws of chemical combination, inorganic chemistry with special reference to its medical applications, and finally a resumé of organic chemistry with special reference to plant and animal substances of use in medicine, and "the chemistry of organic development, and its application to physiology."
H. Practical Anatomy
I. Clinical Instruction

In addition to these courses, there were available to students at the Franklin Medical College the clinical courses in the various hospitals of the city, as well as those afforded by the General Dispensary attached to the College. Here, a new and large lecture room was specially fitted up, in which patients were examined and prescribed for and clinical lectures delivered. Practical instruction in the art of prescribing and compounding medicines was given, and treatment of cases entrusted to advanced students, under the eyes of the professors. Equal opportunity for students of this school was also available at museums and libraries in the city.

Requirements for graduation were:

A. The candidate for the degree of Doctor of Medicine must be of good character, have studied medicine for three years, and attended two courses of lectures on all the branches of medicine, one of which must be at Franklin Medical College.
B. At least one course of Clinical Instruction.
C. A thesis upon some medical subject and the passing of an examination.

A college term, or session, was of conventional length—about four months—October to February, with holidays out. However, the College, in its second *Announcement*, took the stand that an extension in the length of a session of two additional months, would be desirable. There seems to have been no actual session of 1848–49, so that the life-span of the Franklin Medical College ran from Fall,

1846, to Spring, 1848. However, both the *American Medical Directory* (1958), and John H. Rauch's *Report on Medical Education in the United States and Canada*, (1889), give the dates 1847–52 for this school.

III. (A) FACULTY (BY SESSIONS)

Session of 1846–47

Paul Beck Goddard, M.D. Professor of Anatomy and Histology

C. C. Van Wyck, M.D. Professor of Principles and Practice of Surgery

Meredith Clymer, M.D. Professor of Principles and Practice of Medicine

John Barclay Biddle, M.D. Dean, and Professor of Materia Medica and Therapeutics

David Hunter Tucker, M.D. Professor of Obstetrics and Diseases of Women and Children

Levin S. Joynes, M.D. Professor of Physiology and Legal Medicine

James B. Rogers, M.D. Professor of General and Organic Chemistry

Joseph Leidy, M.D. Demonstrator of Anatomy

Session of 1847–48

In this session, "Clinical Surgery" was added to Dr. Van Wyck's title. Dr. Tucker became Professor of the Principles and Practice of Medicine and Clinical Medicine; William Byrd Page, M.D., of Obstetrics and Diseases of Women and Children; Robert Bridges, M.D., of General and Organic Chemistry; and Robert P. Thomas, M.D., Demonstrator of Anatomy. Thus Dr. Tucker replaced Dr. Clymer, and was himself replaced by Dr. Page, with Drs. Bridges and Thomas replacing Drs. Rogers and Leidy, respectively. (Dr. Rogers left Franklin Medical College to accept the chair in chemistry vacated by Robert Hare at the University of Pennsylvania.)

Session of 1848–49

For this session the changes were as follows: Thomas F. Betton, M.D., became Professor of Surgery and Legal Medicine, replacing Dr. Van Wyck in Surgery and Dr. Joynes in Legal Medicine. Dr. Goddard became Professor of Anatomy and Physiology, replacing Dr. Joynes in Physiology.

III. (B) ALPHABETIZED LIST OF MEMBERS OF THE FACULTY

(For faculty grouped by year see above)

Betton,[5] Thomas F., M.D. 1848–49

Biddle, John Barclay, M.D. 1846–49

Bridges,[6] Robert, M.D. 1847–49

Clymer, Meredith, M.D. 1846–47

Goddard,[7] Paul Beck, M.D. 1846–49

[5] Thomas Forrest Betton's contributions include translating M. V. Regnault's: *Elements of Chemistry*, from the French. He was a member of the American Philosophical Society, Vice-President of the Medical Society of the State of Pennsylvania (1848), etc.

[6] Robert Bridges was a physician with deep interests in chemistry and botany With Paul Beck Goddard (see next foot-note), he presented to the Academy of Natural Sciences of Philadelphia an Index of the Genera of the Herbarium there. He assisted Franklin Bache in teaching chemistry at the Philadelphia College of Pharmacy, finally becoming professor there in 1842. He was a member of the revision committee of the *U. S. Pharmacopoeia* in 1840, and in 1870. He was a member of the American Philosophical Society. He contributed papers to numerous journals and was the American editor of Fowne's *Elementary Chemistry* and Graham's *Elements of Chemistry*. Dr. Bridges assisted Dr. George B. Wood in the preparation of several editions of the *U. S. Dispensatory*, and in teaching materia medica at the University of Pennsylvania. He was Librarian of the College of Physicians of Philadelphia from 1867 until 1879.

[7] Paul Beck Goddard was an anatomist and a pioneer in photography. He assisted Robert Hare in chemistry at the University of Pennsylvania, later becoming professor of anatomy in the medical school.

Dr. Goddard's contributions to photography include his discovery that the action of bromine vapor accelerated Daguerre's process. This discovery was fundamental to later progress in the art of photography, making possible its universal applicability to the arts and sciences. He exhibited his results before the American Philosophical Society in 1839, and was elected a member of the Society in 1840. Credit for this discovery has been erroneously given, by British writers, to John Frederick Goddard, a London optician, who announced the same discovery on December 12, 1840—one year after P. B. Goddard's appearance before the Society.

Dr. Goddard's works include:

Plates of the Cerebro-Spinal Nerves . . .

Plates of the Arteries . . .

Joynes, Levin S., M.D. 1846–48
Leidy,[8] Joseph, M.D. 1846–47
Page, William Byrd, M.D. 1847–49
Rogers,[9] James B., M.D. 1846–47
Thomas, Robert P., M.D. 1847–49
Tucker, David Hunter, M.D. 1846–49
Van Wyck, C. C., M.D. 1846–48.

IV. TEXT BOOKS USED

Anatomy—Wilson's Human Anatomy, Wilson's Dissector's Guide

Chemistry—Rogers' Edition of Turner's Chemistry (in 1846), Fowne's Chemistry for Students (in 1847 and 1848)

Diseases of Women and Children and Obstetrics—Rigby's or Lee's System of Midwifery, Ashwell on Diseases of Females, Condie on Diseases of Children (in 1846); Dewee's, Ramsbotham's, Lee's, Tucker's Compendium of Midwifery, Ashwell, Condie (in 1847 and 1848)

Materia Medica—United States Dispensatory, Royle's Therapeutics (in 1846); Pereira's Materia Medica, Griffith's Medical Botany, and Eberle's Therapeutics were added in 1847 and 1848.

Medical Jurisprudence—Taylor's Medical Jurisprudence.

Physiology—Carpenter's Human Physiology.

Surgery—Miller's Principles of Surgery, Ferguson's Practical Surgery, South's Chelius (in 1846 and 1847); Gibson's Institutes and Practice of Surgery, and Sargent's Minor Surgery were added in 1848.

Theory and Practice of Medicine—Clymer's edition of Williams' Principles of Medicine, Watson's Practice, Williams and Clymer on the Diseases of Respiratory Organs (in 1846); Bell and Stokes's Practice, Watson's Practice of Physic (in 1847 and 1848).

V. LIST OF MATRICULATES AND GRADUATES OF THE FRANKLIN MEDICAL COLLEGE

The letters M.D. indicate that the degree of Doctor of Medicine was conferred by the Franklin Medical College in the year named following the degree. [If, however, M.D. is enclosed in parentheses—i.e.; "(M.D.)", neither the date nor the school which conferred the degree is evident from the college records alone.] The absence of M.D. after a name means that available records show only that the person named was a matriculate in the year given. The school year began in the Fall and ended in the following Spring, so that for matriculates "46" would mean the school year from Fall, 1846, until Spring, 1847. Any year stated after the first date following the "M.D." means that the holder of the degree spent that time in the school subsequent to the conferring of the degree, presumably as a post-graduate student.

Most of the documents from which the data for this list are drawn have been assembled by the Library of the College of Physicians of Philadelphia. The National Library of Medicine, Bethesda, Md., and the Library of the Historical Society of Pennsylvania also have holdings on this medical school.

An edition of Erasmus Wilson's *System of Human Anatomy . . .*

The Anatomy, Physiology and Pathology of the Human Teeth.

An edition of F. J. Moreau's *Practical Treatise on Midwifery.*

An edition of Erasmus Wilson's *The Dissector . . .* in 1844, and another in 1851.

The iconographic portion of Rayer's *Theoretical and Practical Treatise of Diseases of the Skin.*

The first American edition of Ashwell's *a Practical Treatise on the Diseases Peculiar to Women.*

[8] Joseph Leidy was an eminent naturalist, anatomist and author. After practicing medicine for two years, and serving as demonstrator of anatomy at Franklin Medical College for the same length of time, he became professor of anatomy at the University of Pennsylvania, holding that post for 38 years. He was the foremost American anatomist of his time, as well as being a paleontologist of note. His bibliography includes over 600 titles. He died at the age of 68, 'from overwork'.

[9] James B. Rogers forsook the practice of medicine to follow the fields of chemistry and geology. With his brother, Robert, he published *A Text-Book on Chemistry.* He was famed for his clarity as a lecturer on scientific subjects. He was a member of the American Philosophical Society.

	Residence	*Preceptor, etc.*
Adair, Hugh, '46	Pennsylvania	
Anderson, Alexander M., '47	Alabama	P. B. Goddard, M.D.
Asay, A. Merrit, '47	Philadelphia	James Bryan, M.D.
Ash, J. W., (M.D.) '47	Philadelphia	M.D., University of Pennsylvania
Barclay, John O'C., (M.D.), '46	Philadelphia	U. S. Navy
Best, A. Milton, (M.D.), '47	Kentucky	M.D., University of Pennsylvania
Beyerle, Henry J., '47	Pennsylvania	A. A. McDonough, M.D
Biddle, Alexander, '47	Philadelphia	Anatomical Ticket
Blakeslee, William R., M.D., '48	Pennsylvania	Harrison Holt, M.D.
Thesis: Fecundation		
Browder, George W., M.D., '47	Virginia	
Thesis: Congestive fever		
Brown, Solomon W., '46	New Hampshire	
Buffington, Benjamin F., '47	Philadelphia	L. W. Buffington, M.D.
Carter, Robert, M.D., '48	Virginia	R. C. Randolph, M.D.
Thesis: Remittent Fever		
Clements, Richard, (M.D.), '46	Philadelphia	
Cole, Cortland, '47	Philadelphia	William F. Smith, M.D.
Cooper, John W., '47	Pennsylvania	R. P. Thomas, M.D.
Councill, Henry B., M.D., '47	Virginia	
Thesis: Malaria		
Davis, Henry F., '47	Ohio	J. B. Biddle, M.D.
Deschapelles, Aristides B., '46	Cuba	
Duffee, W. J., (M.D.), '47	Philadelphia	M.D., Jefferson Medical College
Engle, Nathan S., '46, '47	New Jersey	J. B. Biddle, M.D.
Evans, William Wayne, '47	Pennsylvania	Hilburn Darlington, M.D.
Eversole, Abraham J., '47	Virginia	C. C. Van Wyck, M.D.
Franklin, Benjamin, '47	Maryland	C. G. Brown, M.D.
Gazzam, Joseph, (M.D.), '47	Pittsburgh, Pa.	M.D., University of Pennsylvania
Gebler, Charles F., M.D., '48	Philadelphia	D. H. Tucker, M.D.
Thesis: Typhus Fever		
Hark, Joseph, M.D., '48	Pennsylvania	George Bute, M.D.
Thesis: Inflammation		
Harmanson, John L., (M.D.), '46	Virginia	
Heap, David Porter, (M.D.), '47	Tunis, Africa	J. B. Biddle, M.D.
Henry, Bernard, Jr., (M.D.), '47	Philadelphia	M.D., U. S. Navy
Hopkins, John P., M.D., '48	Virginia	J. P. Smith, M.D.
Thesis: Tetanus		
Hopkinson, Joseph, (M.D.), '46	Philadelphia	M.D., U. S. Navy
Horwitz, Phineas J., (M.D.), '47	Philadelphia	M.D., U. S. Navy
Hudson, John A., '46	Pennsylvania	
Jones, Franklin L., '47	Philadelphia	C. C. Van Wyck, M.D.
Keating, William V., '46	Philadelphia	
Lamborn, Leslie L., '46	Ohio	
Latané, Thomas, M.D., '47	Virginia	M.D., Franklin Medical College
Thesis: Remittent Fever		
Malech, Gustavus H., '47	Philadelphia	Joseph Leidy, M.D.
Marshall, Jacob, '46	Philadelphia	
McAnulty, Andrew J., '47	Pennsylvania	R. J. Marshall, M.D.
McLeod, John, '46	Pennsylvania	
McMahon, J. W., '47	Philadelphia	C. C. Van Wyck, M.D.
Meignen, Leopold, '46	Philadelphia	
Miller, Martin L., M.D., '48	Pennsylvania	E. P. Emerson, M.D.
Thesis: Digestion		
Minor, James M., (M.D.), '46	Virginia	M.D., U. S. Navy
Morgan, W. McKennan, (M.D.), '47	Pittsburgh, Pa.	M.D., University of Pennsylvania
Newsham, Richard, '46	Philadelphia	

TABLE (*Cont.*)

	Residence	*Preceptor, etc.*
O'Neill, James S., '47	Philadelphia	James Bryan, M.D.
Patrick, Isaac, '47	Philadelphia	William F. Smith, M.D.
Powell, L. B., (M.D.), '47	Tennessee	M.D., University of Pennsylvania
Riehle, William B., M.D., '48	Philadelphia	P. B. Goddard, M.D.
Thesis: Inflammation		
Sanborn, Albert H., '46	New Hampshire	
Schlatre, Romain, '46	Louisiana	
Seidenstricker, A. J. Oswald, M.D., '48	Germany	William Keller, M.D.
Thesis: *De Alcoholis*		
Slocum, Alfred M , (M.D.), '47	Philadelphia	M.D., University of Pennsylvania
Smith, Henry, M.D., '48	Philadelphia	Drs. White and Strafford
Thesis: Diseases of the Teeth		
Speck, Frederick, M.D , '47	Pennsylvania	
Thesis: Delirium Tremens		
Stewart, Wallace B., M.D , '48	Pennsylvania	William G. Stewart, M.D.
Thesis: Typhoid Fever		
Sutton, James M., '46	Philadelphia	
Taylor, James, '47	Pennsylvania	E. P. Emerson, M.D.
Taylor, William B., '46	Pennsylvania	
Tiffany, Alonzo M., '46	Pennsylvania	
Vondersmith, Samuel P., '46	Philadelphia	
Wilson, Joseph, (M.D.), '47	Philadelphia	M.D., U. S. Navy
Wister, Caspar, (M.D.), '47	Philadelphia	M.D., University of Pennsylvania
Withers, Franklin N., '46	Pennsylvania	
Zumbrok, Anthony, M.D., '47	Prussia	
Thesis: Muriate of Ammonia		

ACKNOWLEDGMENTS

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Memoir of Alexander H. O'Neal (1882–1961)*

By GEORGE MORRIS PIERSOL, M.D.

IT IS a privilege to pay tribute to one who not only was a classmate in the School of Medicine at the University of Pennsylvania, but also, since our student days, a warm personal friend and a highly respected professional colleague.

The news that on June 25, 1961, Dr. Alexander O'Neal, after a distressing period of disability, had died, was received by his many friends and patients with much sorrow. To the latter especially, Alex O'Neal's death was a great catastrophe. For over fifty years a host of loyal and devoted patients had come to rely upon his professional skill and his kindly, sympathetic understanding. It was to Dr. O'Neal that people in all walks of life turned for comfort and advice, regardless of the nature of their problems.

Alexander H. O'Neal, born on May 12, 1882, at Parsons, Pennsylvania, was by ancestry, education and training a staunch citizen of the Commonwealth of Pennsylvania. His father, Dr. Henry C. O'Neal, was a practicing physician at Gettysburg, Pennsylvania. His mother came from York, Pennsylvania. It seemed but natural that young O'Neal should elect to follow the profession of Medicine when his paternal grandfather, Dr. J. W. C. O'Neal, also had been a physician practicing with notable success in and around Gettysburg.

Until 1901, Alex O'Neal lived for the most part in the neighborhood of his ancestral home. That year he received his Baccalaureate degree in Arts from Gettysburg College, and in the autumn of 1901 entered the School of Medicine of the University of Pennsylvania, receiving his M.D. degree in 1905. Consistently a diligent student, he did well at College, where he was elected to the honorary scientific fraternity, Sigma Xi, and continued to distinguish himself in the medical school, being made a member of the honor medical society, Alpha Omega Alpha.

After leaving medical school, he spent the next four years as an intern and resident, obtaining a broad postgraduate training. He served the regular rotating internship at the Hospital of the University of Pennsylvania. In order to gain experience in contagious diseases, which in those days held a prominent place in general practice, he next completed an internship at the Philadelphia Municipal Hospital for Contagious Diseases. Following this, he rounded out his education by serving as Chief Resident Physician at the Presbyterian Hospital of Philadelphia. He entered upon the general practice of medicine in Wayne, Pennsylvania, in 1909, for which he was well fitted by reason of his varied medical training, his equanimity and friendly personality.

Dr. O'Neal remained in general practice for the remainder of his medical career. In spite of opportunities to become a specialist in a large city, he clung to his original determination to follow the laborious career of general practice in a comparatively rural district. It was fortunate for the growing population of the area, often referred to as the Upper Main Line, that his youthful associations and impelling family traditions were strong enough to prevent Dr. O'Neal from changing his plans. Although at times overwhelmed by his exacting practice, he always remained, as do so many good practitioners, an avid student and reader of scientific literature. Thus he kept himself well informed and constantly aware of medical advances. He showed interest in certain special aspects of medicine. For example, at one time he was Anesthesiologist to the Bryn Mawr Hospital. He recognized early the important role Obstetrics played in the activities of the general practitioner. His abilities in this field

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were such that until 1947 he was an Associate in Obstetrics to the Bryn Mawr Hospital. From the time he entered practice in 1909 until 1951, he served as Attending Physician to the Cathcart Home in Devon, Pennsylvania. As Alex O'Neal grew older, he gradually withdrew from Obstetrics and devoted himself to the physically less strenuous internal medicine, becoming Physician to the Bryn Mawr Hospital from 1947 until his death.

It must not be thought that Alex O'Neal ever followed a restful life. His interests were many and his endurance great. In addition to his medical activities, he assumed his share of responsibility in various civic projects. He was active in the Neighborhood League of Wayne, and played an important role in the Public Health Nursing Service, of which he was Vice President when he retired from that organization's Board of Directors in 1946.

Despite the constant demands of his practice, Alex O'Neal, during his active years, showed his interest in the problems of organized medicine. He took an active part in the deliberations of the Montgomery County Medical Society and was a member of the Pennsylvania State Medical Society and of the American Medical Association. In 1913, he was greatly gratified by his election to this venerable College of Physicians of Philadelphia. The Pennsylvania State Medical Society honored him in 1955 by the award of a plaque for fifty years of unselfish, effective medical service.

Alex O'Neal, always an agreeable companion who enjoyed the association of his friends and former classmates, was not given over much to social activities. He never allowed diversions to distract him from his professional obligations or to dominate his interest in his work, to which he was dedicated. True to his early background, his chief extra-medical activity was farming. He was able to satisfy this desire later in life when he acquired an attractive farm at Lyndell, Pennsylvania. Here he was happy raising a fine herd and indulging in the other activities of a bucolic existence leavened by a moderate amount of medical practice.

In 1919, Dr. O'Neal was fortunate in marrying Mary Bigelow Schultz, who through her energy, resourcefulness and tact, contributed to his success as a practitioner, and was tireless in providing for his well-being and comfort. Especially during the later years, Mrs. O'Neal unselfishly served as a kindly protector to a devoted husband whose health was failing.

Dr. O'Neal derived great satisfaction and contentment from his two sons and four grandchildren. He was particularly gratified that one of his sons, who bears his name, continued the family medical tradition and is today a worthy successor to his father as a successful practitioner at St. Davids.

Alex O'Neal's useful career will serve always as an inspiration to all who would follow the self-sacrificing role of the general practitioner. The community which he served so faithfully for a half century will long remember him as a wise, well-trained physician, and at the same time an understanding, warm-hearted friend. We of the College of Physicians of Philadelphia extend to the family of our colleague deep and sincere sympathy for the loss they have sustained.

Memoir of Morton McCutcheon (1888–1962)*

By EDWARD B. KRUMBHAAR, PH.D., M.D.

DR. MORTON McCUTCHEON, who died July 27, 1962, at the age of 73, was a remarkable combination of scientist, nature lover, teacher and friend. Of Scottish ancestry, he was born in Philadelphia on June 2, 1888, and attended the Germantown Friends School.

He began his college studies at the University of Zurich in Switzerland, studies continued at the University of Pennsylvania. As an undergraduate at Pennsylvania he was elected to the Friars Senior Society. Next came a year at the University of Pennsylvania Law School, where he was a member of the Hare Law Club. Entering the Medical School in 1912, he was graduated in 1917. He spent two summers in Labrador with Dr. Wilfred Grenfell. I quote from a breezy account in the *Scope* medical class book: "Our first impression was obtained when he was first place in the Honor Group of 1917. Not being very talkative and living out of town (Locust Avenue, Germantown), we did not see as much of him as we would like to, but certain gossip has it that he has flashes of humor. We are confident in his prognosis—a successful physician."

Serving with the Army in the First World War, Dr. McCutcheon was commissioned a First Lieutenant and assigned to the 11th General Hospital at Cape May, New Jersey. The Philadelphia neurosurgeon Dr. Charles H. Frazier, was Commanding Officer of the Hospital; McCutcheon's duties were on the medical wards, which had mostly neurosurgical and psychiatric cases.

Soon after graduation from Medical School, Dr. McCutcheon joined its Department of Pathology, where he remained throughout his professional career, becoming Assistant Professor, 1926; Associate Professor, 1934; Professor, 1942; Emeritus Professor, 1955. During most of this period, pathology was studied and taught largely as the morphological changes resulting from disease. McCutcheon, however, studied functional as well as structural changes from the start, a combination that he included in his teaching as well. When some new method appeared, such as electrocardiography, often his own studies seemed to necessitate its use, which he then pursued until he had mastered its details. A chief interest throughout his career was the process of inflammation, on which topic he wrote the long article in Anderson's *Textbook of Pathology*. His professional publications, all based on investigative work, are too numerous to list here. His work was carefully planned and patiently carried out, with readiness to modify the plan as circumstances dictated. Devoid of any element of self-aggrandizement—"never threw his weight around"—as one relative put it, and completely honest, when a line of investigation failed, with the natural persistence of his Scottish ancestry, he cheerfully turned to some other line of approach for the same general subject.

After his retirement, obligatory at age 65, he continued coming to the Laboratory, less frequently but still methodically, and gave lectures for another three years. Coming three or four days a week to my one, he characteristically tried to match my day in the week, and at lunch always kept a seat for me next to him, leading the conversation away from the prevalent shop-talk of the younger men. His lectures to the second year class were as carefully planned as his investigations. Often written out *in toto* to insure clarity and diction, the lecture was never read *verbatim* and seldom even brought to the lecture room. Small wonder that he was recognized by the students and faculty as one of the school's best lecturers—perhaps as the best. Indeed, a

* Prepared and published at the request of the Council of the College of Physicians of Philadelphia.

colleague once called him the very best lecturer in the whole school. In other phases of student instruction—such as at their desks, in the fresh tissue groups, and on any other occasion—he went over the material bearing in mind the need for stimulating more than supplying facts. Patiently, in the words of his favorite Chaucer: "Gladly wolde he lerne and gladly teche."

When elected to national societies, he performed his duties with the same thoroughness. He served as president of the Philadelphia Pathological Society and of the American Association of Experimental Pathology. He also was a member of the American Society of Pathologists and Bacteriologists, the American Cancer Society, the American College of Physicians, and the Physiological Society of Philadelphia. At the meetings he followed the program closely, but rarely entered discussions, as many of the audience seemed only too prone to do. He was a member of Phi Beta Kappa, Tau Delta Theta (legal), Sigma Xi, Alpha Omega Alpha, and AMPO (medical) fraternities. He was also chairman of the University Library Committee for several years, and a member of the John Archer Society of the University of Pennsylvania.

His avocational devotion to bird study was evidenced through the years in the botanical garden of the University where, with his colleagues, birds of all sorts were watched daily and new arrivals tabulated. At his summer home at Wallingford, Vermont, birds shared his attention with other wild life and the rich botanical display of that countryside. I remember on one visit he showed me a number of varieties of ferns that he had collected in the neighborhood and succeeded in transplanting to his own garden. Painting was a favorite recreation too—his depiction of barns seemed to me to have a distinct Vermeer-like quality.

Well-read, Dr. McCutcheon's literary methods had something in common with his other activities. Homer, for instance, he translated daily from the Greek for the last five years of his life. Chaucer he studied in the original until it had become as easy for him as a modern poet. He read French writers extensively—essays more than novels. All in all, "He was a verray parfit gentil knyght." It is good to know that in his last illness he was spared the anguish of great pain and contemplation of possible chronic invalidism or mental deterioration.

He was married in 1926 to Madeline Owens, who survives him. He is also survived by an older brother, Thomas Potter McCutcheon, Emeritus Professor of Chemistry at the University of Pennsylvania. Morton McCutcheon's funeral service brought together his friends from various walks of life. He will long be missed by those who were fortunate enough to be among his friends. His remains were buried at West River, Anne Arundel County, Maryland, near those of his wife's ancestors.

Memoir of Lauritz S. Ylvisaker (1889–1962)*

By JOHN H. ARNETT, M.D.

LAURITZ S. YLVISAKER at the age of 72 remained an avid tennis and squash player. Indeed, it was during a squash game at the Merion Cricket Club that the attack of atrial fibrillation occurred which prompted the x-ray which revealed a growth at the hilum of the lung. In discussing his chest film he remarked, "It looks like an inoperable carcinoma, but I have much to be thankful for. I have enjoyed a full life for 72 years." He had, indeed; genial, friendly and popular; he was blessed with unusual health, energy and a sunny disposition.

His forebears lived in the woodlands to the north of Bergen, and his father, a Lutheran minister, emigrated to this country from Norway. Lauritz was born at Robbinsdale, Minnesota, on September 11, 1889. He went to Luther College in Decorah, Iowa, and then, like his five brothers, attended the Lutheran Seminary, of which his father was president, in St. Paul, Minnesota. Lauritz and his brother Rangwald became physicians; the other four became ministers; one, William, became president of Luther College.

Lauritz Ylvisaker graduated from the Medical School of the University of Minnesota in 1919, served his internship in the University of Minnesota Hospital, his residency in the Minneapolis General Hospital, and then taught cardiology in his *alma mater* while engaging in private practice. In 1928, he became Medical Supervisor for the Prudential Life Insurance Co. in New York and then its Associate Medical Director. In 1935 he became a Fellow of the American College of Physicians. In 1944 he came to Philadelphia as Medical Director and Vice President of the Fidelity Mutual Life Insurance Company. He became a Fellow of the College of Physicians of Philadelphia in 1950, and Chairman of the Section on Public Health, Preventive and Industrial Medicine in 1958. He was active in the Heart Association of Southeastern Pennsylvania and it was during his presidency (1951–1954) that the Association began offering fellowships in cardiology to promising young physicians who had finished their residency. The number rapidly increased from a single recipient to its present complement of fifteen fellowships. During some of this time he was also Vice President of the Pennsylvania Heart Association. In 1951 he filled with distinction the office of President of the Association of Life Insurance Medical Directors, and for some years was Chairman of its Medical Information Bureau Executive Committee. In an age when the exclusion of the handicapped from industry was the rule, he preached the judicious utilization of their talents, and described in one of his rare papers, entitled "The Cardiac in Industry" (1), how this policy had proved itself practical and beneficial in his own company's home office.

After retirement from the Fidelity Mutual Life Insurance Company in 1961 he became consultant for the Harleysville Insurance Company and joined the Student Health Service of Drexel Institute of Technology, where his friendliness and charm endeared him to both students and faculty.

The name Ylvisaker connotes the setting of the sun over the woodlands; to his many friends the name seemed appropriate when, at the Bryn Mawr Hospital some weeks after an exploratory operation, he died on July 15, 1962.

Survivors include his wife, Winifred, a son, William T. Ylvisaker, a daughter, Mrs. Robert L. Heller, five grandchildren, four brothers and a sister.

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Memoir of Harold Leon Goldburgh (1894–1962)*

By ROBERT I. WISE, PH.D., M.D.

DR. HAROLD LEON GOLDBURGH gave to medical students, young physicians, and to all who knew him, an abiding impression of strong motivation. He appreciated the honor of being a physician and teacher. He gave thanks for this wonderful privilege of life. He was a tower of strength in expressing, by actions and energetic participation, the philosophy of a great heritage in religious faith, in medicine and in teaching. He dedicated his life to these services.

He was born on June 8, 1894, in Philadelphia, Pennsylvania, where he attended secondary school and was graduated from Central High School. He held the Francis Shain Scholarship at the Jefferson Medical College where he was graduated in the Class of 1915, an honor graduate and member of Alpha Omega Alpha. During his days as a medical student he was a member of Phi Delta Epsilon Medical Fraternity, and during the rest of his life gave counsel and guidance to the young men of his fraternity, as well as to other medical students. After internship at the old Jewish Hospital from 1915 to 1917, he served as a Lieutenant in the United States Navy Medical Corps during World War I.

Because he loved medicine and believed in constant support of its precepts, he planned his home with his bride, Hortense Pearlman Goldburgh, at 1932 Spruce Street in order to be near the Jefferson Medical College, the College of Physicians of Philadelphia, the Philadelphia County Medical Society and the Philadelphia General Hospital. He and Mrs. Goldburgh raised a son, Dr. Warren P. Goldburgh, and a daughter, Mrs. Marvin A. Levey.

Harold Goldburgh rose through the academic ranks at Jefferson Medical College to become Professor of Clinical Medicine and Assistant Attending Physician at the Jefferson Medical College Hospital. He gave unstintingly of his time and efforts at the Philadelphia General Hospital, where he attained the distinction of Chief of Medicine, and at the Northern Division of the Albert Einstein Medical Center, where he became Senior Attending Physician. He was Consultant in Internal Medicine to the Philadelphia Psychiatric Hospital.

Dr. Goldburgh was a Diplomate of the American Board of Internal Medicine and a Fellow of the American College of Physicians. He was a member of the American Diabetic Society, the Jefferson Society for Clinical Investigation, the Solomon Solis-Cohen Medical Literature Society, the Publication Committee of the College of Physicians of Philadelphia and of the Philadelphia County Medical Society, the American Medical Association, the Pennsylvania Medical Society, the American Association for the Advancement of Science, the American Association for History of Medicine, the American Heart Association, the American Society of Internal Medicine, the International Society of Internal Medicine, and the Masonic Lodge.

Dr. Goldburgh set the pace for others, but it was not his goal to be a model for them. The fact that he was a model was consequence of his interest and work. His love was the ward round, the clinical conference, the opportunity to help the student learn more rapidly and easily. He is remembered by many physicians for the years that he loaded his car with medical students at Saturday noon to take them for an afternoon of ward rounds at the Philadelphia General Hospital. This was a stimulating, profitable experience, and an

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example of initiative above requirement for both teacher and students.

He brought to students and colleagues the excellent clinical observation of the old masters of the past, and kept abreast of current medical knowledge by his habit of reading daily. Service to his profession was completed by reporting his own medical experiences in the medical literature. Changes were not resisted for he maintained a youthful philosophy of progress and believed that to stand still in the later years of life was to deteriorate.

His humor and joys, his pleasant practical jokes, and his tender regard for others endeared him to those fortunate ones who were his friends. He had a delightful habit of writing a letter after completion of a teaching assignment which stated, "I am thankful for the honor and privilege that has been given me to participate in this program." This was Harold Leon Goldburgh. His death on October 6, 1962, removed a fine gentleman from our midst.

Memoir of Theodore Franklin Bach (1900–1962)*

By CLYDE H. KELCHNER, M.D.

THEODORE FRANKLIN BACH, physician, teacher, author, sportsman, friend, died January 18, 1962, of septicemia secondary to a chronic sinusitis, which had plagued him for at least the three decades during which it was the author's privilege to be a close friend.

Ted was born in Johnstown, Pennsylvania, August 11, 1900, the son of Edwin Emmet Bach, an educator interested in sociological problems. He was proud to bear the names of both of his grandfathers, the Rev. Theodore Bach and David Franklin Kimmel; each had participated in the Civil War. His maternal ancestors came to America before the American Revolution, his paternal forebears in about 1840.

As a child, Ted spoke of medicine as his vocational choice; as a man he was dedicated to his profession. He received his A.B. degree from the University of Pennsylvania in 1924. There he was a member of Delta Tau Delta and Sigma Xi. He was graduated from Temple University School of Medicine in 1928, the recipient at graduation of three prize awards. After medical residency at Presbyterian Hospital in Philadelphia, he became an associate of the late Dr. Ralph Pemberton, the 'Father of American Rheumatology', until 1948. He directed, at various times, the Arthritis Clinics at Presbyterian Hospital, Philadelphia Orthopedic Hospital, and Abington Memorial Hospital; at the latter he was Consultant in Rheumatology at the time of his death. He also served on the staffs of the Bryn Mawr Hospital and the Graduate Hospital of the University of Pennsylvania.

He was a lecturer at the School of Nursing at Presbyterian Hospital, as well as at the School of Nursing at Abington Memorial Hospital. He was a member of the faculty of the Graduate School of Medicine of the University of Pennsylvania from 1931 to 1962, rising to the rank of Associate Professor of Medicine in 1948. He was made a member of the "Twenty Five Year Club"; the pin of which was awarded to him posthumously and sent to his mother. He was a dedicated, dynamic teacher. He often put postgraduate students on their mettle to answer penetrating questions and to discuss bedside observations.

Early in his career he recognized the great value of the Mütter Museum of our College. He browsed around when he borrowed bone specimens to illustrate his lectures and interest others in exploring the treasures in the Museum. Later, in his travels abroad, he procured additional specimens which are now a part of the Museum Collections. For more than ten years he served on the Mütter Committee, and for five years was Chairman of the Committee on College Collections. He had a part in introducing the public to its rich resources. Future Doctors and Nurses Clubs in the Philadelphia public schools were urged to make annual pilgrimages to the Museum to become better acquainted with the background of the medical profession.

Many scientific articles were written by him, as well as the chapters on focal infection, the treatment of rheumatoid arthritis, and on osteoarthritis, in the F. A. Davis Co. book, "Arthritis and Related Conditions", (1947) which he edited. This book was written to help general practitioners with the diagnosis and treatment of arthritic patients. It was translated into Spanish, "Artrites Enfermedades Afines", and used widely by doctors in Spain, as well as in Latin America and South America.

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The U. S. Food and Drug Administration called him as a consultant at times, to evaluate gadgets and devices which were alleged to possess curative value, but actually exploited the afflicted. One of the most noteworthy of these was the Dinshaw Gueldaldi Case, in which he was an expert witness for the government in the Camden Federal Court. The Court's ruling in this case ended the lucrative sale by these 'wise men of India' of a small box which emitted various colored lights, the color to be selected depending upon the disease to be treated.

The 'Pemberton Group' at Abington Memorial Hospital recognized the interdependence of various disciplines in the treatment of the arthritic patient. As an outgrowth of this thinking, consultants in other medical and surgical areas, who had shown interest in working with the rheumatologist on the many problems of the arthritic, were invited to join the group's journal club, which consisted of Ralph Pemberton, Ted and Wesley Scull, William Westcott, and myself, later joined by George Farrar and John Lansbury of Temple University Hospital. Thus was founded the Philadelphia Rheumatism Society, the oldest organization of its type in America, which recently celebrated its twenty-fifth anniversary. After more than a decade of service as first Secretary-Treasurer of the Society, during which he often delved into his own pockets to defray the expenses of office, Ted was elected to the presidency.

For many years Dr. Bach was a member of the Scientific and Medical Advisory Committee of the Eastern Pennsylvania Chapter of the Arthritis and Rheumatism Foundation. Other medical organizations benefited from his membership: the College of Physicians of Philadelphia, the American College of Physicians, and the American Medical Association, of all of which he was a Fellow, as well as the Philadelphia Medical Society, the Pennsylvania Medical Society, the American Rheumatism Association, and the Medical Club of Philadelphia.

Ted was also a gifted amateur artist, an active member of the Philadelphia Art Alliance and of the American Physicians Art Association. He won many awards in competition, even posthumously, when two of his still-life canvasses in oil, "Yellow Mimosa", loaned by Dr. and Mrs. Samuel Hadden, and, "Flower Study", loaned by Marion Bach, were entered by the Philadelphia County Medical Society in the Delaware Valley Physician's Art Exhibit, June 10–24, 1962. Philadelphia Medicine editorialized at the time: "The joy of creating something is a healing pleasure. Music, poetry, carving, drawing, painting, all relax by permitting a tired spirit to escape the confines of tight conventialism for a brief sojourn in the ethereal realms of Nirvana where individual existence is blended into perfection."

His office bespoke his many interests. His enthusiasm for gracious living he shared with all. He loved antiquity in books, furniture, art and decor. His coat lapel was never without a boutonnière, nor his office without flowers—not as conversation pieces, but because he enjoyed them and felt they contributed to his patients' enjoyment and well-being.

Interested in sports, he was a former University of Pennsylvania cross-country runner, and an avid collector of Ivy League athletic mementoes. He was a member of the University's Varsity Club, the Pennsylvania State Fish and Game Protective Association, and the Physicians Motor Club. He was interested in aspiring young athletes and gave generously of himself and his resources to encourage them, especially through the Y.M.C.A., the Friends Select School Playground and the Quaker City Playground at Fourth and Arch Streets. Because so many were underweight at the latter facility, he arranged through the Dairy Council and the Philadelphia Department of Health for the serving of free milk and graham crackers there.

He was a member of the Woodland Presbyterian Church; whose calendar noted on his passing: "I have fought a good fight, I have finished my course, I have kept the Faith" (*II Timothy, 4:7*). Surviving him are his mother, Mrs. Edwin Emmet Bach, and three

sisters, Marion L. Bach, Mildred P. Bach, and Mrs. James B. Hudson.

Although Ted had a large and difficult practice, he approached each patient as a fresh challenge to his skill. He never treated "joints", but related his treatment to the whole individual. He practiced medicine with the kindly, sympathetic understanding of the old family doctor and the scientific expertness of the modern specialist. He had the courage to practice scientific medicine during a period of rapid transition in rheumatology, when so-called 'miracle drugs' too often displaced sound, physiological approach to therapy. His enthusiasm for the cause he so faithfully espoused gave steady continuity to his work.

Ave atque vale, Ted,
Physician, artist, friend,
The ceaseless battle won—
Your good fight has an end.

Memoir of Angelo M. Perri (1901–1959)*

By P. M. LUCCHESI, M.D.

OUR community can ill afford the loss of a dedicated, competent physician and Public Health Officer. And yet, we lost to death, on September 18, 1959, our good friend, Angelo M. Perri, M.D., M.P.H. Angelo Perri's dedication contained such special intensity that in the medical profession, where dedication is commonplace, his great desire to serve stood out from the ordinary. He belonged to a special breed of humanity. He was a man who gave of himself and his knowledge without regard for personal gain, a man who deliberately turned from the more gainful field of private practice to spend his life in the public health field where the need for good physicians is great but the financial rewards are small. An intensely religious man, his religion and his way of daily life were wrapped into one. He found his satisfaction in living through serving his fellow man.

Dedicated to his family, he was equally dedicated to his friends. I am grateful that I was numbered among them.

Our careers ran in parallel grooves. Angelo Perri was born in Philadelphia on May 11, 1901. We studied at the Roman Catholic High School, Dr. Perri being one year ahead of me. He began his training at the University of Pennsylvania one year before I did, and again I followed, one year behind, at Jefferson Medical College. He was graduated from medical school in 1925, and interned at St. Agnes Hospital in Philadelphia. From 1927 to 1935 he was an Instructor in Neurology at Jefferson Medical College and Assistant Neurologist to the Philadelphia General Hospital.

I later followed Dr. Perri into the broad field of public health where he quickly made his mark. He was appointed a Health Officer in the Division of Communicable Diseases of the Philadelphia Department of Health. In 1943, he was promoted to Senior Health Officer, and in that year he received his degree of Master of Public Health from the University of Pennsylvania. A year later, my friend Dr. Perri was promoted again. He became Chief and Diagnostician of the City's Division of Communicable Diseases.

Through the years, he was a man of many parts. He was a physician and an excellent one. He excelled as an administrator, a teacher, as a medical writer, and as a valued member of many committees and organizations. He became a Fellow of the American Public Health Association and of the American College of Physicians. He was an Associate Professor of Preventive Medicine at Hahnemann Medical College. He belonged to the Philadelphia County Medical Society, the Philadelphia Pediatric Society, the Pennsylvania Medical Society, the Pennsylvania Public Health Association, the Rheumatic Fever Committee of the Philadelphia Heart Association, the Board of Directors of the Crime Prevention Association, the College of Physicians of Philadelphia, the Southern Pennsylvania Chapter of the American Red Cross, and the Royal Society of Health of London. He was Director of District Health Center Number Six in Philadelphia at the time of his death. With all of his memberships and associations, he still found time to be adept at his favorite hobbies of fishing and photography.

In everything he did, Dr. Perri was a man of good judgment and maturity. He was, in short, a good man and a good doctor. He served well throughout his lifetime. And this fact is the essence of the nobility of the man!

* Prepared and published at the request of the Council of the College of Physicians of Philadelphia.

Memoir of Thomas Emery Machella (1910–1962)*

By T. GRIER MILLER, M.D.

THE efficient and dedicated Secretary of our College, Thomas E. Machella, died of a malignant cerebral lesion on April 10, 1962. At the time of his death he was in the seventh year of his official service to us, and had accepted his final term of office with some hesitation and indeed against advice. The advice was given because of his excessive professional activities and some suspicion as to his health. Characteristically, however, he never turned down a request for service to a patient, a colleague, or a medical organization.

Tom Machella was born in the mining town of Eckley, Pennsylvania, on January 28, 1910, had his early education in the Mining and Mechanical Institute of Freeland, Pennsylvania, and secured his A.B. degree in 1931 and his M.D. degree in 1935 from the University of Pennsylvania. During his senior year in the medical school he became an Assistant in the Department of Physiology and, as a result, was able in 1936 to publish in the *American Journal of Physiology* a paper on "The Velocity of Blood Flow in Arteries in Animals". He then spent two years as an Intern in the University of Pennsylvania Hospital, this being followed by one year as its Chief Resident. By that time he had decided to cast his lot with me in the Gastro-Intestinal Clinic of our Hospital, and, in preparation for that, accepted a Commonwealth Fund Fellowship in Experimental Physiology for a year's work at the Mayo Foundation. As a result of his activities in Rochester, with Frank C. Mann and G. M. Higgins, he published eight papers, six as the senior author. These had to do with the effects of the sulfa drugs on the blood and blood-forming organs of albino rats and on the role of food intake on the restoration of liver function.

On his return to Philadelphia in 1939, he began his career in clinical gastroenterology, but at the same time resumed some investigative work with Dr. H. C. Bazett as an Instructor, and subsequently as an Associate, in Physiology. During the next three years he published eleven papers, most of them on vitamin studies.

From 1942 to 1945, Machella was in the U. S. Army with the 20th General Hospital in Assam, India. During that time he maintained his interest in clinical research, having built with his own hands a small laboratory in one of his wards. In June, 1943, he wrote me as follows: "I am having a most interesting and fascinating time studying an epidemic of jaundice. . . . It would thrill you, as it does me, to walk into a ward with 44 icteric patients . . . some with hemorrhagic phenomena, not due to K or B deficiency, but to scurvy; some with splenomegaly and leukopenia. Gastric acid disappears during the attacks, then reappears. I am trying to buy or steal three pigs. Not a day passes that I do not learn something new".

One of his great contributions at that time was the development of a method for the treatment of cerebral malaria by the intravenous administration of atabrine. He published thirteen papers as a result of his Army experience and received the Bronze Star Medal, the citation stating that he had originated and improved methods for the treatment of a variety of diseases affecting troops in the area, thus lowering the morbidity and mortality of those diseases, especially malaria. Also it stated: "The initiative and

* Read before the College of Physicians of Philadelphia, 7 November 1962. Prepared and published at the request of the Council of the College of Physicians of Philadelphia.

devotion to duty displayed by Major Machella reflect great credit upon himself, his profession and the Medical Department of the U. S. Army".

Subsequent to his army experience, Dr. Machella returned to the University of Pennsylvania, and continued his investigative and teaching activities in our Gastro-Intestinal Clinic. In 1948 he became its Chief, and in 1952 an Associate Professor of Medicine. All of his work had a bearing on diseases of the digestive tract. Perhaps his most original contribution during this period was his physiological explanation for the dumping syndrome. He contributed much to our understanding of hepatic and biliary diseases, peptic ulcer, ulcerative colitis and diseases of the pancreas; also of the clinical effects of drugs, especially urecholine. In all he published 127 articles in medical journals and in addition made extensive contributions to medical textbooks, including Nelson's "Loose Leaf Medicine", "Modern Medicine", Harrison's "Principles of Internal Medicine", and Meakins' "The Practice of Medicine".

Tom was a highly competent practitioner. Although he did no practice outside the hospital, he was in demand as a consultant and was expert in the art of medicine. He knew how to put himself into the position of his patients, understand their problems and extend sympathy with cheer and help. All his patients adored him, and especially the children.

Both Phi Beta Kappa and Alpha Omega Alpha keys were obtained by Tom and he was an Oxford Scholar at the University of Pennsylvania. He was a member of the American Federation of Clinical Research, the Interurban Clinical Club, the American Society for Clinical Investigation, the American Clinical and Climatological Association, the American Gastroenterological Association, the American College of Physicians, and the Association of American Physicians. Also he was a member of the Committee on Nutrition of the Pennsylvania State Medical Society and of the Subspecialty Board in Gastroenterology of the American Board of Internal Medicine. He was a Consultant to the Council on Drugs of the American Medical Association, a Consultant in Gastroenterology to the United States Department of Labor, and a Consultant in Gastroenterology to the South Eastern Pennsylvania Law Association.

Dr. Machella was an individualist, always preferring to work by himself. He had an inquiring mind and an enormous capacity for work. His primary objective in life was to discover new facts. He was completely dedicated to medicine and to his medical school. He refused to consider appointments elsewhere. He worked day and night, often into the early hours of morning, seven days a week and throughout the year except for an annual month's vacation. His avocation was hunting and fishing and he had a home in the Pocono Mountains, but even there over weekends he often kept up his routine professional activities.

Tom was exceedingly modest and soft-spoken. He was generous, kind and self-effacing. It is now appreciated that for a year or more he had been aware, or at least suspicious, of some physical ailment, but he had never mentioned this, even to his wife. He finally collapsed in his office only a few months before his death. Had he lived longer, he undoubtedly would have received many additional honors. He was a loyal and devoted Fellow of this College and his passing is a grievous loss to his many friends, his medical school, and the profession. He is survived by his widow, Ruth Emily Conrad, whom he married on December 5, 1945, and who was a devoted and effective helpmate to him; also by a mother of 93 years and two brothers.

Report of the Secretary for the Year Ended December 18, 1962

Stated Scientific Meetings:		*Attendance*
January	The Forty-sixth Nathan Lewis Hatfield Lecture Willis J. Potts, M.D.	118
February	The Sixteenth Weir Mitchell Oration William C. Menninger, M.D.	218
March	The Fourth Hira S. Chouké Lecture Sir F. Macfarlane Burnet, M.D., O.M., F.R.S.	325
April	The Eighty-third Mary Scott Newbold Lecture John Eager Howard, M.D.	172
May	At the Philadelphia County Medical Society. Presentation of the Strittmatter Award to T. Grier Miller, M.D., by Charles M. Thompson, M.D., Chairman, Award Committee. Presentation of Citations to Physicians who have completed fifty years in the practice of medicine, by Daniel H. Bee, M.D., President, Medical Society of the State of Pennsylvania.	125
October	The Twenty-second Alvarenga Prize Lecture John H. Gibbon, Jr., M.D.	99
November	Joint Meeting with the Philadelphia County Medical Society. The Forty-second James M. Anders Lecture Leona Baumgartner, PH.D., M.D.	84
December	The Eighth Benjamin Musser Lecture on Clinical Medicine Philip H. Henneman, M.D.	65

Regular Business Meetings

	Total Ballot
January 3, 1962	309
April 4, 1962	278
May 16, 1962	337
November 7, 1962	272
December 5, 1962	299

The College of Physicians of Philadelphia awarded the Alvarenga Prize Award on July 14, 1962, to John H. Gibbon, Jr., M.D., for his outstanding work on the development of the heart-lung machine and his major contribution to the whole field of thoracic surgery.

Sections of the College	*Membership*
Ophthalmology	73
Otolaryngology	53 & 2 Honorary
General Medicine	140
Public Health, Preventive and Industrial Medicine	44
Medical History	169

	Fellow	Non-Res.	Assoc.	Honorary Foreign	Honorary U.S.	Hon. Assoc.	Total
December 19, 1961	1064	143	0	2	4	2	1215
Died during year	19	4					23
Resigned	3	3					6
Elected	26			1			27
Transferred from Resident to Non-Resident	−7	+7					
Transferred from Non-Resident to Resident	0						0
Forfeited	0						0
December 18, 1962	1061	143	0	3	4	2	1213
Life Membership							
New Type							
Under 70	25	6					
Over 70	20	8					
Old Type (Commutation dues)	7						
	52	14					
Dues Remitted:							
Before 1962	38	5					
During 1962	3	0					
	41	5					
Annual Contributors as of December 18, 1962	968	124					

WILLIAM A. STEIGER, M.D.
Secretary

Report of the Treasurer for the Year Ended November 10, 1962

Assets

General Fund:		
Cash in bank and on hand		$335.72
Maintenance and Reserve Fund:		
Cash in bank	$11,596.12	
Investments	28,603.74	
		40,199.86
Miscellaneous Contributions Fund:		
Cash in bank		1,705.00
Library Historical Collections Fund:		
Cash in bank		1,042.88
Special Contributions for Use of the Library:		
Cash in bank—overexpended		(9.75)
Trust Funds:		
Uninvested principal cash	40,798.50	
Uninvested income cash (restricted)	14,767.41	
Mortage	36,000.00	
Real estate	158,905.33	
Bonds	343,628.40	
Preferred stocks	280,582.17	
Common stocks	400,418.10	
		1,275,099.91
Plant Fund:		
Land—15-25 South 22nd Street	95,000.00	
Building	1,420,747.93	
Furniture and fixtures	1.00	
Deposits on perpetual fire insurance policies	11,462.28	
		1,527,211.21
		$2,845,584.83

Funds

General Fund:			
Library general account		$7,241.54	
Library medical documentation service		2,823.88	
Life membership—uninvested funds		352.00	
Reserve for contingencies—uninvested funds		190.02	
Unexpended operating fund balances:			
Current operations—overexpended	($15,205.48)		
Committee on entertainment	147.02		
President's room	525.00		
Friends of library	20.00		
Books	869.88		
Rare books	152.96		
Campaign expense	125.95		
Portrait	126.47		
Harvey's "De Motu Cordis" Facsimile	(202.18)		
Committee on Interns and Residents	3,168.66	(10,271.72)	$335.72
Maintenance and Reserve Fund—principal			40,199.86

Miscellaneous Contributions Fund—principal			1,705.00
Library Historical Collections Fund—principal			1,042.88
Special Contributions for Use of the Library—principal			(9.75)
Trust Funds:			
Principal net worth			
Discretionary common trust fund	1,185,260.00		
Legal common trust fund	24,097.94		
Trust funds not pooled	14,974.56		
Fund for purchase of units in discretionary common trust fund	36,000.00	1,260,332.50	
Income net worth			
Discretionary common trust fund	13,375.93		
Legal common trust fund	789.11		
Trust funds not pooled	602.37	14,767.41	
			1,275,099.91
Plant Fund—principal net worth			1,527,211.21
			$2,845,584.83

NOTES: The various fund investments are shown at their recorded values, which values substantially represent cost.

GENERAL FUND

STATEMENT OF CASH RECEIPTS AND DISBURSEMENTS

November 11, 1961 to November 10, 1962

Receipts:				
Income on investments, net of agents fees:				
Trust funds		$71,191.31		
Less:				
Amount transferred to income of the several restricted trust funds	$10,617.06			
Erlanger Garage expenses paid	7,744.86	18,361.92		
		52,829.39		
Add: income transferred from Erlanger Garage to DCTF in excess of profits earned by garage		2,865.13	$55,694.52	
Income from funds, principal of which is not administered by College		3,207.78		
Less, amount transferred to income of a restricted fund		1,198.30	2,009.48	
Interest on mortgage			1,683.27	$59,387.27
Contributions:				
Fellows dues			59,352.50	
Life membership			1,611.00	
Use of hall and projector			2,673.00	63,636.50
Transfers from other funds:				
For survey by Committee on Interns and Residents:				
Maintenance and Reserve Fund			5,000.00	
For purchase of chairs for the Library:				
Special contributions for use of the Library			2,555.00	7,555.00
Library:				
Contribution plan		18,657.00		
Photostats, fines, etc.		26,599.55		

		45,256.55	
Medical documentation service		37,261.27	
			82,517.82
Miscellaneous			2,351.85
Total receipts			215,448.44
Disbursements:			
Operating expenses:			
Hall Committee		$38,452.60	
Office of the Secretary		7,282.05	
Office of the Treasurer		9,713.00	
Pensions		3,210.41	
Campaign expenses		10.00	
Publication Committee		6,472.84	
Books		2,150.30	
Entertainment Committee		1,874.58	
College Collections Committee		3,989.11	
Committee on Interns and Residents		1,831.34	
Library			
Salaries	$83,055.29		
Books, journals, supplies, etc.	41,444.93	124,500.22	
Medical documentation:			
Salaries	26,821.91		
Other expenses	7,615.48	34,437.39	
General funds used to purchase units in Discretionary Common Trust Fund for Pension Reserve Fund		1,437.92	
Purchase of chairs and tables		803.00	
Purchase of chairs for the Library		2,555.00	
			$238,719.76
Excess of disbursements over receipts			(23,271.32)
Cash balance, November 10, 1961			23,607.04
Cash balance, November 10, 1962			$335.72

STATEMENT OF COST OF INVESTMENT UNITS PURCHASED IN DISCRETIONARY COMMON TRUST FUND BY THE GENERAL ENDOWMENT FUND

November 12, 1961 to November 11, 1962

Balance, November 12, 1961		$412,882.32
Receipts:		
Entrance contributions	$900.00	
Voluntary contributions from fellows, etc.	1,426.18	
Book of Remembrance	539.00	
Amortization of mortage—13th and Locust Streets	2,250.00	
	5,115.18	
Deduct:		
Amount insufficient to purchase one unit, credited to unit adjustment account	8.08	
		5,107.10
Balance, November 11, 1962		$417,989.42

STATEMENT OF COST OF INVESTMENT UNITS PURCHASED IN THE DISCRETIONARY COMMON TRUST FUND BY THE COLLEGE EXTENSION FUND

November 12, 1961 to November 11, 1962

Balance, November 12, 1961		$2,963.97
Receipts:		
Voluntary contributions from Fellows	$175.00	
Income earned on invested principal	134.92	
	309.92	
Less: Amount insufficient to purchase one unit, credited to unit adjustment account	17.04	
	292.88	
Add: Amount transferred from unit adjustment account to purchase two additional units	36.62	329.50
Balance, November 11, 1962		$3,293.47

STATEMENT OF COST OF INVESTMENT UNITS PURCHASED IN THE VARIOUS TRUST FUNDS BY THE OTHER RESTRICTED ENDOWMENT FUNDS

November 12, 1961 to November 11, 1962

Discretionary Common Trust Fund			
Balance, November 12, 1961			$592,947.44
Receipts:			
S. Weir Mitchell Associates journal fund		$30,164.67	
General endowment for the library		1,148.34	
Life membership fund		735.91	
Pension reserve fund		1,941.26	
Transfers from unit adjustment account:			
General endowment for the library		18.31	
		34,008.49	
Add: adjustment in J. P. Crozier Griffith Library Fund		15.71	
		34,024.20	
Less: Amounts insufficient to purchase one unit, credited to unit adjustment account	$34.41		
Adjustment in Mary Scott Newbold Lecture Fund	.04	34.45	33,989.75
Balance, November 11, 1962			626,937.19
Legal Common Trust Fund			
Balance, November 12, 1962 (no change during year)			23,500.00
Trust Funds Not Pooled			
Balance, November 11, 1962 (no change during year)			14,974.56
Total other restricted endowment funds, November 11, 1962			$665,411.75
Total Funds at book value, November 11, 1962			$1,086,694.64

KENDALL A. ELSOM, M.D.
Treasurer

Annual Report on the Library*

ADMINISTRATIVE

Regional Cooperation Again. The Library of the College of Physicians of Philadelphia has always emphasized its obligation to do comprehensive collecting of the medical literature for the Philadelphia area. We have recognized that the "medical literature explosion" requires that some *one* medical library in the area acquire as many different book and journal titles as the budget will allow, and beyond this, as many as can be acquired by gift and exchange. We have seen this acquisition policy as necessary to support the College Library's regional function to have and to hold the widest possible range of medical publication for Philadelphia medicine, whether these holdings support patient care, teaching or medical research.

This emphasis has been based upon our definition of the library's function, not upon its past, present or projected future size. And this definition of function embraces the idea that one research library with a wide and balanced collection is enough for this area, and absolutely necessary to it. Further, this acquisition program has not been influenced one way or another by value judgments on the content of the materials collected. We have not been persuaded to this policy because 20th Century medicine has set a record in understanding and knowledge through dramatic breakthroughs, breakthroughs which are reflected to some extent in increased numbers of medical publications. On the other hand, we have not been discouraged into thinking this acquisition policy is over-ambitious when we hear that much of the literature explosion is generated by a "publish or perish" philosophy of medical reporting. We have steadfastly preferred to assume that the major function of this regional research library is to pursue a dynamic, internationally comprehensive acquisition policy to the end that when the call comes for this material—however often or seldom, soon or late, for whatever reason, from whatever level of medical or para-medical competence—the book or journal will be here for Philadelphia's physicians, physicians who have been medical leaders, who continue to be medical leaders and who have kept this library great, whatever the changing demands of the times.

Variation on a theme. Lately, however, we have grown increasingly skeptical of analyses of medical library needs which seem to assume that the size of a book collection is the major criterion to be considered in attempting to meet the literature requirements of the medical profession. We are skeptical of a view that seems to take for granted that because greater quantities are published, greater numbers of volumes per medical library are going to solve the dilemma of inadequate medical library service.

If it is not too late—or too tortuous—we want to outline here in general terms our understanding of what the functions of the several kinds of medical libraries should be so that the medical community which, so far, is supporting these libraries will have at least an alternate view to the prevailing quantitative one.

Such an outline must, of course, begin with the National Library of Medicine, which from John Shaw Billings to Frank B. Rogers has collected comprehensively, not primarily to provide books and journals to readers within its geographical area, but rather to serve the international and national medical community through its published and widely distributed medical bibliography, which is produced from these acquisitions.

If the Surgeon General's Catalogue has been called "America's greatest gift to medicine," the 1960 Index Medicus might just as well be called "America's 20th Century medical miracle." While the National Library of

* November 1, 1961–October 31, 1962.

Medicine does provide many of the conventional library services, these are good side effects. The National Library of Medicine's major value to Philadelphia and other regions is its concentration on and continuing specialization in medical bibliographical control. Because this is so, the vast majority of medical libraries enjoy the kind of security which comes from knowing that, in the main, medical literature is as well if not better controlled than any other subject discipline. These same medical libraries are thus released from constructing all but the most specialized bibliographies tailored to meet local and individual needs.

The Medical School Library. Down the line in size, but certainly not in importance, is the medical school library. Its responsibility, as we have understood it, is to introduce the student, a highly-intelligent, seriously-committed graduate student, to the medical literature and to meet the medical literature needs of the major research interests of the institution's particular staff.

Acquisition and servicing of necessary instructional material for the student, a mature man, but a beginner in medicine, will entail substantially less than the full array of medical publications. To a large extent, the students' readings are pre-selected for him. Reading lists and reserve book departments' multiple copies of everything from reprints of the latest and best medical article on a curricular topic to Jones' *Fundamentals of Anatomy* are important services which the student has a right to expect from his instructors and his medical librarians until he learns the elements of his profession, and can make his own selections. Too often, this preselection and multiple copy library service has been called "spoon feeding," when the truth is that it is a guidance device which is precisely what the students have enrolled in medical school to receive.

Interestingly enough in this connection, the December, 1962 *Bulletin of the Yale Medical Library* reported that for the period July 1, 1961 to June 30, 1962, ten journal titles furnished over 20 per cent of volumes lent. In the light of this, Yale decided to collect multiple sets of some 80 medical journal titles. Presumably, second copies of 10-year runs of these 80 titles will meet the bulk of the demand. The College of Physicians of Philadelphia conducted a similar study, 1957/58, and found that 100 medical journal titles satisfied almost one-half the demand here. While these studies are susceptible to a variety of interpretations, it does seem reasonable to infer from them that multiple copy acquisition by the medical school library might answer a great proportion of the demand within the institution. Rapid communication devices to the regional library could be expected to take care of the rest.

A second function of the medical school library is instruction in the *use* of the major bibliographical tools in medicine, so that when the student comes to write the first paper (seldom a research paper in the sense that a new dimension is added to medical knowledge) he has a beginning knowledge of the methods of bibliographical research. Such instruction in use will become increasingly important in the medical school library as computer-produced bibliographical tools sacrifice readily understandable presentation to achieve wider and faster bibliographical control.

These two important services to the medical student will affect the medical school library's acquisition policy qualitatively, so that it will include a greater number of texts and monographs in multiple copies, and now, it seems, multiple copies of a selected number of medical journal titles. Its collecting policy for the bibliographical apparatus will, of course, be comprehensive.

But the medical school library also has a responsibility to its faculty. Here again, this responsibility is to a particular faculty pursuing research interests in specialized areas of investigation. The medical school library will of necessity, then, collect materials to support the institution's major research interest, producing, as it does so, an unbalanced book collection, but one specifically tailored to meet

the requirements of its own staff. It will be relieved, on the other hand, of the comprehensive, balanced, clinical, preclinical, national and international collecting which remains the responsibility of the regional library which stands back of it, just as it is relieved of producing the bibliographical apparatus which stands back of all medical libraries.

The Hospital Library. Finally, there is the hospital library, the type medical library most recently made a requirement for accreditation. In the main, it is the smallest (in terms of volumes held) and is attached sometimes to a teaching hospital and other times to a non-teaching hospital—if by teaching hospital we mean one associated with a medical school. The hospital library, through supporting graduate medical education—interns and residents in the various specialty programs offered by the particular hospital—will concentrate on acquisition of clinical materials to support the now-practising, now-busier physician responsible for and increasingly competent in patient care. In a very real sense, the hospital library, functioning as it does on the clinical team, is the raison d'être for all the other medical libraries which support it with properly built book collections. The hospital library's own collection, however, will be unbalanced, will be weighted toward clinical materials, but will include, as well, the materials necessary to support other ancillary medical services in the hospital.

The Library Dollar. It is perhaps gratuitous to add that this description of major functions which determine acquisition policies does not make other customary library services unnecessary in any one of these types of medical library. But such a description can not help but suggest that emphases on these—volume, direction, speed and financing of inter-library loan, reference services, etc.—will vary widely and will alter the proportion of the library dollar spent by each medical library for these services under its own roof and beyond its own roof to support the regional medical library in the area, the regional library which exists to serve them as well as the pharmaceutical houses, the medical publishers and the small hospitals.

The library dollar is a hard-to-come-by asset, and it does seem that wise allocation of it should be prefaced by a thorough analysis of varying functions within medical libraries in the Philadelphia area, an analysis that should call upon the best thinking of Philadelphia's physicians and Philadelphia's medical librarians. If the Library of the College of Physicians of Philadelphia is to continue to fulfill its regional role, the support that is necessary for it, beyond the continuing staunch and imaginative support of its own Fellows, can come from only a few possible extramural sources. It can come from federal funds through direct aid, state funds through direct aid, federal, state and private funds through allocation of a proportion of the research and training grant income in Philadelphia or from greater support from the medical institutions which rely upon it. But it will not come from any of these sources unless there is a thorough understanding of the complementary, inter-locking and interdependent role each of these types of library plays in the Philadelphia area.

It is time that the entire subject of the College Library's regional role be placed in open forum and solved or dissolved on the basis of a realistic understanding of the roles of *all* the other medical libraries in the region. There is within the Philadelphia area a real opportunity to create a regional system which will not only serve the literature needs of the medical community but which will effect, as well, a regional economy, which is, after all, the natural extension of the original library economy idea. Such a regional system is also a very real extension of the College of Physicians of Philadelphia's "Non sibi sed toti" tradition of service.

M. E. F.

The College Library in 1961/62

A Lean Year. Poetic justice dictated that last year's report, rejoicing in progress made, should be followed by a year of travail. The

problems created by turnover of key personnel, reassignment of staff responsibilities, and search for competent new staff were mitigated to a large degree by the heroic response of library staff members and by the sympathetic patience of the Library's loyal users, who adjusted their demands to help the College Library through understaffed periods.

Personnel. The most crippling blow to the Library was the decision of Miss H. Muriel Hodge to resign after eleven years of distinguished service to the Library in order to provide a home for her mother in Geneva, New York. Miss Hodge served the Library first as Cataloger, then as Assistant Librarian, Preparation Division, and finally as the Assistant Librarian, who also performed the professional functions of cataloging.

Fortunately, plans had previously been made to employ a full time cataloger, thereby releasing the Assistant Librarian for administrative duties. Some months before Miss Hodge's departure, Miss Muriel Zeldis transferred from the Serials Librarianship to the Cataloger's chair and was able to benefit from her predecessor's training. The Assistant Librarianship was vacant during the last three months of the current report year. By the end of the year the Library was fortunate enough to secure the services of Miss Mary Elizabeth Feeney, the Librarian of the Hospital of the University of Pennsylvania, who took over the duties of the Assistant Librarianship on November 1, the beginning of the next report year.

The vacancy created in the Serials Department by Miss Zeldis' metamorphosis into a cataloger was filled by the promotion of Mrs. Marion I. Schmieder from the position of Assistant Serials Librarian to Serials Librarian. Miss Dorothy Minton, a Serials Assistant, was promoted to the rank of Assistant Serials Librarian, and Mrs. Catherine Ledwell moved from the Paging Staff to a new Serials Assistantship which was provided by the 1961/62 budget.

Confusion Compounded. These manoeuvres were further complicated by three resignations and one protracted illness. The Readers' Service Division Assistantship was held by two persons during the year, and was again vacant as the year closed. Miss Mary M. Coady held this job from July, following the resignation of Miss Janice Pharr, until September. She continued to work on a part-time basis until the end of the year, by which time a full-time replacement had been found in the person of Miss Ann Vosburgh, who was a Circulation Desk Assistant at the Washington University School of Medicine in Saint Louis.

Assistant Cataloger. Miss Mildred Gray suffered a heart attack in July and was unable to return to full-time employment until October 15th. Miss Brenda Egnatovich, a student from Gallaudet College, stayed in the Library for two months following her practice work period in June. She was most helpful in both the Cataloging and Historical Departments. Miss Lois Master, Mr. Michael Fleming, Mrs. S. Leon Israel, Mrs. Eileen C. Williams, Mrs. Linda Margulies, and Mrs. Anna Siegers were all employed temporarily or on part-time bases in the library's effort to compensate for the variety of shortages noted above.

Paging Personnel. Mr. Louis DiEleanora was hired to replace Mrs. Catherine Ledwell when she was promoted to a Serials Assistantship, and he, in turn, was replaced by Mr. Edward Farley following his resignation in September.

Weight Control. It is small wonder that the Librarian had no trouble complying with his physician's suggestion that ten or fifteen pounds be pared from his frame, or that most of the harassed staff members who stuck it out were only too happy to see the year end. The shape of things to come looks promising, but the year just concluded evokes no nostalgia.

More Pleasant Matters. Antidotes to despair were provided during the year by the continued success of the S. Weir Mitchell program, improvements in physical facilities, the support of friends and several opportunities to get away from it all.

S. Weir Mitchell Associates. The gratifying response noted in last year's report was continued during the new year. The second fifty endowments were close to realization as the year ended. A number of dinners were hosted by Drs. George I. Blumstein, Jonathan E. Rhoads, Thomas M. Durant, and they deftly recruited new S. Weir Mitchell Associates and increased materially thereby the principal of the fund which will provide income in perpetuity for the purchase and binding of specific journals selected by the Associates. In each case a memorial bookplate testifies to the interest of the donor, who has also in many cases dedicated the journal endowment to the memory of a respected relation or distinguished colleague.

At the end of the year, the first annual (hopefully) banquet of the S. Weir Mitchell Associates was held in Mitchell Hall. Dr. John H. Talbott, Editor of the *Journal of the American Medical Association*, presented an address on "S. Weir Mitchell". Plaques which were specially designed for the occasion were presented to the Associates.

With the advice of the Library Committee, a special bookplate was prepared for insertion in the journal volumes. The bookplate die was prepared from a pen and ink sketch specially drawn for the purpose by Miss Edna Hill, inspired by the Ordway Partridge bust of Mitchell which is located in the Hall which bears his name. Special legend slips bearing the names of the donor and the dedicatee, if any, together with identifying degrees and titles, have been printed for appendage to the bookplate itself in each volume.

Periodical Room Seating. Nineteen new chairs were purchased for the Periodical Room. These chairs are similar to the ones provided for the Reading Room several years ago.

Eberhard Foundation. The College Library continues to receive a grant from the Eberhard Foundation to assist in its effort to acquire indexes to the chemical literature.

Research Associateship. A completely new development materialized this year in the appointment of Harold J. Abrahams, PH.D., as the first Research Associate of the College of Physicians of Philadelphia. Dr. Abrahams received a grant from the National Institutes of Health, Division of General Medical Science, to study the extinct 19th century medical schools of Philadelphia. A large amount of previously unorganized biographical and administrative information will be made available through this study of local medical schools which have not survived. For the first time in its history, the College will receive an overhead allowance for a research project making use of the library's facilities. The resulting publications have already begun to appear in the *Transactions & Studies of the College of Physicians of Philadelphia.*

B.W.L. Foundation. A donation of $200 for the purchase of books for the Library was received from the B.W.L. Foundation.

Ventilation. Several stand fans were purchased to dissipate some of Philadelphia's summer heat, following the investigation of more ambitious plans for ventilation or air conditioning of parts of the building. $100,000 would be needed to cool the reading rooms, stacks, and working area of the Library. In addition, income of about $4,000 per year would be needed for electricity and depreciation allowances. A considerably less complete program calling for the installation of eight large exhaust fans was also given up for the present time.

Institute for Experimental Medicine and Surgery. The College Library shipped twenty-two cartons of medical journals to the Institute of Experimental Medicine and Surgery in Montreal, to assist in the rebuilding of this collection, which was destroyed by fire.

Philadelphia County Medical Society. Following many years of deliberation, the Philadelphia County Medical Society discontinued its library this year. The College was pleased to accept the bookcases from this library, which will be used to augment the storage shelving for duplicates in the basement. Steel catalog card drawers were also put to good use.

Visitors. Freshman medical students from Hahnemann Medical College, Temple Uni-

versity School of Medicine, and the Woman's Medical College made their annual visits to the College Library to see the resources which are available to them and to learn, by direct contact, the interest on the part of the College staff in supplementing the library resources available in their own schools.

Students from the Graduate School of Medicine of the University of Pennsylvania visited the Library for the second year. On another occasion, the Librarian spoke to one-hundred high school students who visited on Library Careers Day. Opportunities in the fields of special librarianship were discussed and a conducted tour of the building was offered.

Visitors from further away were two Medical Library Association Fellows from Hyderabad and Chile.

Volunteer help. The Library was pleased to receive voluntary assistance from the wives of two Fellows of the College. Mrs. George E. Farrar, Jr., continued her bookmending assistance and visited the bindery at the Free Library of Philadelphia to learn more about this art. Mrs. Thomas M. Durant helped the Circulation/Reference desk greatly by answering the telephone one morning each week.

Roof leaks. The timely discovery of several leaks in the roof over the new stack area of the Library taught the lesson that even a new roof must not be taken for granted. The storage of the Library's rare books on the top floor of this new addition increased the uneasiness caused by this unexpected development.

Professional Staff Activity. The Medical Library Association has given the following staff members assignments: Miss Marcia Davidoff serves as Chairman of the Membership Committee of the Philadelphia Regional Group of the Association. Mr. Elliott H. Morse is the Chairman of the Sub-Committee on Bibliography of the Medical Library Association. He is also Convention Chairman for the 1965 Convention of the Association, which will be held in Philadelphia. He continues to be a member of the Budget and Finance Committee for the Second International Congress on Medical Librarianship, which will be held in Washington, D. C., in 1963.

Miss Davidoff was one of 25 medical librarians chosen to participate in the Institute on Development in Medical Library Administration held in Chicago following the Medical Library Association Convention. Miss Muriel Zeldis and Mr. Morse also attended this convention.

Miss Mary Elizabeth Feeney, who joined our staff as Assistant Librarian after the end of the report year, is serving as consultant to the Hospital of the University of Pennsylvania on library matters.

Mr. Morse was the dinner speaker at the Fall meeting of the Pittsburgh Regional Group of the Medical Library Association.

The activities of Miss Edith A. Wright and Mr. W. B. McDaniel, 2d, are reported in the historical section of this report.

Benefactors. A list of donors of books and other library material appears in the statistical section of this report.

The Library acknowledges its gratitude to the following institutions which have shared the operational costs of the College Library.

NON-PROFIT INSTITUTIONS

Antioch College
Bryn Mawr Hospital Medical Staff
Franklin and Marshall College
Graduate School of Medicine of the University of Pennyslvania
Hahnemann Medical College
Harrisburg Hospital
Institute for Cancer Research
*Jefferson Medical College
Nazareth Hospital
Philadelphia General Hospital
Seton Hall College of Medicine and Dentistry
Temple University School of Medicine
*U. S. Naval Hospital Staff, Philadelphia
University of Pennsylvania School of Medicine
University of Pittsburgh School of Medicine
*Walson Army Hospital Staff
Woman's Medical College of Pennsylvania

COMMERCIAL INSTITUTIONS

Air-Shields, Inc.
Atlas Chemical Corporation

* Received after the close of the fiscal year.

Baltimore Biological Laboratories
Beasley & Ornsteen
Bell Telephone Company
Bernstein & Bernstein
Borden Company—Chemical Division
Campbell Soup Company
Dechert, Price & Rhoads
Dentists' Supply Company
Dilworth, Paxson, Kalish, Kohn & Dilks
E. I. du Pont de Nemours, Haskell Laboratory
E. I. du Pont de Nemours, Lavoisier Laboratory
E. I. du Pont de Nemours, Stine Laboratory
Freedman, Landy & Lorry
General Electric Co., Missiles & Ordinance Systems Department
Gray & Rogers
Halbert & Kanter
Harvey & Thomas
Institute for Scientific Information
Kontes Glass Company
La Wall & Harrison
Lederle Laboratories
Lee Ramsdell & Company
Lewis & Gilman, Inc.
Kurt Loeb Association
MacAndrews & Forbes Company
McNeil Laboratories
Matrix Corporation
Mead Johnson & Company
Medical Literature, Inc.
Merck Sharp & Dohme
Morgan, Lewis & Bockius
Mulford Colloid Laboratories
National Drug Company
Norwich Pharmacal Company
Ortho Pharmaceutical Corporation
Oxy-Catalyst, Inc.
Pennsylvania Railroad Company
Pepper, Hamilton & Sheetz
Chas. Pfizer & Company, Inc.
Prudential Insurance Company
Quaker Chemical Products Corporation
Richter, Lord & Levy
Rittenhouse Book Store
A. H. Robins Co., Inc.
Rohm & Haas Company
William H. Rorer
Samson Laboratories
Schnader, Harrison, Segal & Lewis
Smith, Kline & French Laboratories
E. R. Squibb & Sons
Sun Oil Company
Arthur H. Thomas and Company
Wallace Laboratories
Wyeth Laboratories

E. H. M.

Historical

The Historical Section Comes of Age. The aid and issue to the Historical Cataloguing Project foreshadowed in our last annual report came duly to term—in the shape of a permanent 'chair' of historical cataloguing, the first in the library's long history. The signal date is 1 April 1962, and the happy issue unquestionably a lineal descendant of the Historical Cataloguing Project initiated, in February, 1959, under a beneficent grant from the American Philosophical Society.

In the period under review, Mrs. Maria A. Shchuka, the Project cataloguer, was able to devote only a few hours a week to the work, and was obliged to terminate her association with it at the end of May, 1962. As indicated above, Miss Edith A. Wright, PH.D., was appointed to the library's new chair of historical cataloguing on 1 April. Miss Hildegard Gutzmann, valued assistant on the Project, was able to give us only a few hours a week, also, but continued her assistance throughout the report period—aiding, first, Mrs. Shchuka; then, for two months, both Mrs. Shchuka and Miss Wright; and, finally, the latter. The pattern, in other words, shows the germinal Project limping toward its inevitable close, but being delivered of issue well calculated to perpetuate its important services to those cultivating the field of medical history. It is worthy of note, in this connection, that, in the period from 1 April through 31 October, our highly accomplished new historical cataloguer has, with Miss Gutzmann's necessarily limited assistance, put on the stalls 914 historical items, whose various points of potential usefulness called for the typing of 4,615 catalogue cards, and corrections to be made on 588 older, related citizens.

Acquisitions. These, of course, were far too numerous to permit a full account of them. A few of special interest—because of provenance and intrinsic value—are listed below, in brief form.

From Esmond R. Long, M.D.

1) Astruc. Tractatus pathologicus. Geneva, 1743.
2) Bichat. Traité des membranes en général, et des diverses membranes en particulier. Nouv. éd. Paris, 1802.
3) Cruveilhier. Traité d'anatomie pathologique générale. 5 vols. Paris, 1849–64. (Oddly, both the College's and the Gross Library's sets of this are incomplete.)
4) Fernel. La pathologie. 2. ed. Paris, 1660.
5) Morgagni. De sedibus et causis morborum. 4 vols. in 2. Louvain, 1766–67.
6) Schenck, Joh., von Grafenberg. Observationes medicae de capite humano. Basel, 1584.

From Fred B. Rogers, M.D.

1) *Hardwicke's Science Gossip for 1869.* (Unaccountably, the library lacked this foundation-stone of Osleriana: it contains Osler's first published writing—"Christmas and the microscope".)
2) Morgagni: portrait of, drawn by the English artist Nathaniel Dance (later, Sir Nathaniel Dance-Holland), and engraved by Angelica Kauffman, in Italy, during the 1760's. (It was in this decade that Morgagni first published his classic *De sedibus*; that he was visited by John Morgan, cofounder of the College; and that Kauffman painted her celebrated portrait of Morgan, a copy of which hangs in the College's Mitchell Hall.)

From Walter B. Shelley, M.D.

A bibliographically important collection of letters and photographs received by Dr. Shelley and his collaborator (*Classics in Dermatology*) John T. Crissey, M.D., from the following noted dermatologists: Stuart S. Allen, Paul Blum, Aldo Castellani, Helen O. Curth, Niels Danbolt, Oskar Gans, Henri Gougerot, Sir Archibald Gray, Sven Hellerström, Eric W. Hoffmann, C. Guy Lane, J. E. McDonagh, J. P. O'Brien, Earl D. Osborne, G. A. G. Peterkin, Hermann Pinkus, R. V. Rajam, Gustav Riehl, Jr, Walter Schönfeld, Francis E. Senear, John H. Stokes, Alfred Stühmer, Marion B. Sulzberger, Richard L. Sutton, Richard L. Sutton, Jr., Albert Touraine, Barney Usher, J. P. Botelho Vieira, F. Parkes Weber, Max Winkler, and S. J. Zakon.

By Purchase

1) Carera, Anton. Raf. Le confusione de medici. Milan, 1652. (The author's name was already in our catalogue by virtue of an attack on this work published three years later; the defendant work can now be consulted at first hand.)
2) Duchesne, Jos. Pestis alexicacus . . . Paris, 1608. (An early work on syphilis by a versatile writer (better known as 'Quercetanus', the Latinized form of his name), a number of whose works are in the library.)
3) Glaser, J. F. Beschreibung seiner neuerfundenen Blutwaage. Hildburghausen, 1758. (Of interest for its description, and depiction, of instruments invented by the author for the weighing and measuring of the blood in bloodletting.)
4) Hebenstreit, J. E. Pathologia metrica. Leipzig, 1740. (Pathology in verse; a comprehensive index leads to 179 subjects on the order of *Aneurisma*, *Cancer*, *Cardialgia*, *Diabeta*, *Mentis morbi*, etc.

Fugitive Leaves. In the period covered, seven numbers of the *Leaves* were put out to pasture. No. 49 concluded "The First Catalogue of the College Library, 1818". Nos. 51–3 reproduced, with annotations, "Seven Letters to Charles D. Meigs". No. 54 presented "A Checklist of Early Illustrated Herbals in the Library of the College". No. 55 was devoted to

the very rare "Antwerp, 1512, Edition of the Ketham *Fasciculus Medicinae*", the library's copy of which had only recently been properly identified. No. 56, "More about 'Eve'", through the fortuitous means of a bookseller's catalogue, added to the genealogical information on a very rare fugitive sheet in the library's historical collections.

Exhibits. An exhibit commemorating the 200th anniversary of the first publication of Morgagni's *De sedibus* was enhanced by the timely gifts of Dr. Long's copy of the Louvain edition, and Dr. Rogers' example of the Dance-Kauffman portrait, both noted above. A satellite exhibit of the medical aspects of the life and work of Thomas Eakins ran concurrently with the magnificent exhibit of Eakins' work at the Philadelphia Art Museum. Our Fellow Dr. Henry A. Arkless, from his private collection, provided two much-appreciated philatelic exhibits: one, of medicinal plants represented on postage stamps; the other, of stamps used in the fight against malaria. The *Fugitive Leaves*' checklist of early illustrated herbals in the library led, naturally, to an exhibit based on it. A gift, by our generous friend and Fellow Dr. J. Monroe Thorington, of a striking collection of patent medicine advertisements, supplied the material for another exhibit. Another, selected and arranged by Miss Wright, was based on Robert B. Austin's recently published *Early American Medical Imprints, 1668–1820.* As usual, special exhibits were provided for the meetings of the Section on Medical History, for an occasional College meeting, and, on request, for groups having their first corporate introduction to the facilities of the College.

Dr. William N. Bradley. What the death of Dr. Bradley, 17 April 1962, meant to the College and its library is affectingly and judiciously set forth by Dr. Samuel X Radbill, a member of the Library Committee, in a memoir published in the January, 1963, issue of the College's *Transactions & Studies.* The library's historical staff warmly appreciates this tribute to a loyal friend and generous donor to the historical facilities of the library.

Staff. Miss Wright attended the meetings of the Rare Book Section of the Association of College and Research Libraries, at Miami, in June. The Curator, by invitation, contributed an article on the library's collection of early illustrated herbals to *The Herbarist*, No. 28, 1962; to it was appended the checklist subsequently reproduced in the *Fugitive Leaves.* He repeated a demonstration of interesting early works on nutrition for a library class from the Drexel Institute of Technology. In May, 1962, he was elected to the Council of the American Association for the History of Medicine.

W. B. McD., 2d

Medical Documentation Service

When we review the activities of the Medical Documentation Service for the year ending October 31, 1962 we immediately are struck by the range of services rendered to a constellation of clients. Although *Service* is a word frequently used and thus worn of meaning, it is the key concept in this department of The Library. We re-type manuscripts for individual practitioners; we prepare bibliographies, and check those prepared by others; we abstract or translate articles on a great variety of subjects in a wide range of languages. Every journal received by The Library is scanned for articles of interest to our clients who range from foundations through pharmaceutical companies to individuals. These in turn receive references quickly in the form stipulated. This range of work is carried on by a staff consisting of a director, executive secretary and a translator-abstracter plus such typists as may be called for by the work load. Sub-contractors, of course, abstract and translate in languages outside the staff's gifts.

During the year, Robert E. Asnis, resigned to establish his own translating and abstracting service and Paul Walter became our staff abstracter and translator. Mrs. Margaret Holloway, who had been employed by The Library for several years, resigned because of changed domestic conditions. Miss Adelaide Flamer was employed as a typist until she

secured a position in her field of specialization. Miss Gloria Stokes became part-time typist. Mrs. Jean Stevens kept the entire department operating smoothly and as efficiently as conditions would permit.

It has become our practice to give our activities in summary. The figures for 1960–61 are in parentheses.

Average number of subjects scanned per month	24	(28)
Total references reported	7,359	(8,416)
Approximate number of clients (scanning)	18	(16)
Abstracts prepared	2,000	(2,400)
Bibliographies prepared	216	(281)
Translations	316	(300)

The incomparability of some of these categories is immediately apparent. A bibliography covering 25 years of the world literature and comprising 300 items is recorded as *one* as is a short search for "two or three recent articles on the treatment of psoriasis". Similarly translations are essentially different in many aspects—language, length, and thus incomparable.

The gross income was about $37,300 of which $7,400 came from abstracts, $4,100 from searches, $10,500 from scanning and $14,000 from translations. We paid out about $26,100 in salaries to our regular and part-time employees, and about $7,100 to subcontractors. There was, therefore, a modest amount to allow for administrative overhead, rent, telephone and certain supplies.

W. L. B.

STATISTICAL SUMMARY

Inventory

	1962		*1961*	
Accessioned items[1]				
Incunabula[2]	420		420	
Manuscripts and typescripts	1,219		1,208	
General collection	211,986		207,172	
Accessioned pamphlets	5,004		4,669	
		218,629[3]		213,499[3]
Unaccessioned items[1]				
Reports	28,802		28,799	
Theses	60,690		60,411	
Pamphlets and reprints	231,499		231,499	
		321,023		320,709
Portraits[4]				104,639

[1] Accessioned items in this library comprise the total number of bound volumes and such unbound pamphlets as have been cataloged as separate bibliographical units regardless of their size.

There remain many thousands of unaccessioned pamphlets awaiting accessioning and cataloging. A true quantitative and qualitative picture of the library's holdings cannot be presented until this wealth of neglected material has been processed and duly registered in our 'accessioned' or 'volume,' count.

[2] The library owns 422 incunabula, but there are two cases of two bound together, reducing the number of accessioned items.

[3] Included in this figure are the following collections which are on permanent deposit in the library: Gross Library, 3,976 accessioned and 4 unaccessioned items; Parry Library of the Obstetrical Society of Philadelphia, 217; Mütter Museum, 200 (Mütter Museum books may not be removed from the College building).

[4] Including 124 oil, and 268 other, framed portraits in the care of the Committee on College Collections. The count of portraits represents the number of entries on the cards in the portrait catalog. The entries represent, in turn, both loose portraits and those in books, many of them, of course, being merely different reproductions of a single original.

Currently Received Serials

	Subscription	*Gift*	*Exchange*	*Total*
U. S. A.	369	411	65	845
Western European Continent	662	68	110	840
Latin America and West Indies	28	90	75	193
United Kingdom and Eire	132	27	31	190
Canada	9	16	8	33
Eastern European Continent	101	49	35	185
Asia (including Japan)	32	69	59	160
Pacific (including Australasia)	3	13	9	25
United Nations	11	1		12
International	42	6		48
Africa	3	9	16	28
Grand Total 1962	1,392	759	408	2,559
Grand Total 1961	1,357	782	413	2,552

New titles: A total of 176 new serial titles was added in 1961:62.

Separate issues received, checked in the Kardex record, and shelved totaled 21,157. In addition, thousands of duplicate issues were received as usual. No attempt was made to count those held merely for exchange or other use.

Visitors in the Norris (Periodicals) Room for the year totaled 3,341 (1961: 3,569)

Readers' Use of the Library

Library Hours. The Library was open, during the academic year, from 9:00 to 9:30 on Mondays and Wednesdays, from 9:00 to 5:00 on other weekdays. During June, July, August, and until the first Monday after Labor Day, the Library was open from 1 to 9:30 on Tuesdays; from 9:00 to 5:00 on other weekdays, except Saturdays, when it was closed. The following legal holidays were observed: Thanksgiving, Christmas and New Year's, Memorial, Independence, and Labor Days.

Visitors to Reading Room:

	Totals
1962:	16,690
1961:	11,603

Circulation:

	Totals	*Intra-mural*[5]	*Extra-mural*[6]	*Books*	*Journals*
1962:	83,272	64,707	18,565	10,460	72,812
1961:	67,168	45,406	21,762	10,440	56,728

Interlibrary loans: The Library sent 15,176 (1961: 16,035) volumes on interlibrary loan to 257[7] (1961: 250) libraries in 31 (1961: 32) states, Washington, D. C., and Canada, and has borrowed 22 (1961: 3) volumes from 2 (1961: 2) libraries.

Photoduplications: 82,545 pages were photoduplicated on request (1961: 67,547)

Accessioned acquisitions:

1962: 5,130 volumes (2,389 by purchase; 2,193 by gift; 548 by exchange).
(Books, 1,548; Periodicals, 3,277; Pamphlets, 305).

1961: 4,571 volumes (2,358 by purchase, 1,585 by gift; 448 by exchange).
(Books, 1,518; Periodicals, 2,982; Pamphlets, 71).

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[5] The number of volumes "consulted in the library" includes only those supplied on demand. Readers have access to the bound volumes of periodicals and reference works kept on the shelves in the Reading Room; the Fellows, and occasionally others, by special permission, have access to the book-stacks. There are, therefore, many volumes consulted of which no accurate record can be kept.

[6] This figure includes 5287 unbound current issues circulated from the Periodicals Room.

[7] This figure includes 36 commercial institutions which are registered borrowers.

Non-accessioned acquisitions:[8]
1962: 3 Reports (1961: 5)
279 Theses (1961: 253)
No Miscellaneous items (1961: 21)

Donations

The donors of library materials for the past year number 91 (1961: 156). The Library is indebted for large gifts of books, pamphlets, and unbound periodicals to the following donors: American College of Physicians; Biological Abstracts; Dr. S. Bricker; Children's Hospital; Dr. A. G. Fewell; Franklin & Marshall College; Dr. R. A. Kern; Lea & Febiger; Dr. A Persky; W. B. Saunders Co.; Smith, Kline & French Laboratories; Temple University; Dr. G. L. Tobias; Dr. I. J. Wolman; Woman's Medical College.

Various publishing houses, among the large group of corporate donors, have presented volumes as follows: F. A. Davis Company, 11; Lea & Febiger, 21; J. B. Lippincott Co. 34; W. B. Saunders Co., 92.

Other individual donors were as follows: Dr. M. L. Andes; R. Asnis; C. W. Bellingrodt; Drs. P. A. Bishop, O. V. Batson; Miss L. Bendix; Mrs. A. E. Bothe; Drs. W. N. Bradley, T. Butterworth, J. F. Buzzard, S. S. Barkulis, E. J. Carey, B. Chance, C. Farr, L. W. Fox, H. Freed, E. Fryer, J. Gershon-Cohen, G. E. Groth, R. H. Ivy, J. E. Kaplan, J. G. Kerr, J. A. Kolmer, W. M. Krogman, E. B. Krumbhaar; Mrs. I. K. Langman, Drs. W. G. Leaman, C. Levy, E. R. Long; Mrs. M. Macdonnough; Drs. C. MacFarlane, R. H. Meade, T. G. Miller, S. Mudd, G. W. Norris; bequest of Dr. F. R. Packard; Drs. Z. H. Pamir, M. DeW., Pettit, G. M. Piersol, F. B. Rogers, W. P. Schaeffer, H. G. Scheie, T. G. Schnabel, P. H. Sechzer, H. Selye, E. R. Sherwood, R. H. Shryock, J. Solis-Cohen, E. B. Spaeth, J. A. Sterling, J. M. Thorington; United States Naval Hospital; Dr. J. R. Willson.

The Staff[9]

Librarian
Elliott H. Morse

Assistant Librarian
Mary Elizabeth Feeney

Cataloger
Muriel Zeldis

Serials Librarian
Mrs. Marion I. Schmieder

Circulation-Reference Librarian
Marcia Davidoff

Order Librarian
Mrs. Kathryn E. Miragliotta

Assistant Serials Librarian
Dorothy Minton

Readers' Service Division Assistants
Ann Vosburgh
Mrs. Eileen Williams

Assistant Cataloger
Mrs. Anna Siegers

Serials Assistant
Mrs. Catherine Ledwell

Library Secretary
Mildred C. Gray

Historical Collections
W. B. McDaniel, 2d, PH.D., *Curator*
Edith A. Wright, PH.D., *Rare Book Cataloger*
Mrs. Linda Margulies, *Typist*

Medical Documentation Service
Walter L. Bethel, PH.D., *Director*
Mrs. Jean C. Stevens, *Executive Secretary*
Paul Walter, *Bibliographer*

Pages
Edward Romasko, Jr.
Edward Farley
Christopher Beck
Frank Arcaro

Xerox Operators
Francis T. Kelleher, Jr.
Philip Ballinghoff

Approved:
John Franklin Huber, M.D.
Chairman, Library Committee

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[8] As usual, not all the pamphlets, theses, and numbers of various journals listed as received have been checked for keeping or discard at the close of the library year.

[9] Library staff list as of February 1, 1963.

Annual Report of the Committee on the Mütter Museum and College Collections

EACH year the Mütter Museum of the College of Physicians seems to grow more popular with the various Medical Colleges and Public Schools. This year there were 2802 visitors, many from foreign countries, and the usual groups from Radnor High School, St. Leonard's Academy, Hahnemann Medical College and students from the Graduate School of Medicine of the University of Pennsylvania. A large number of future medical technicians from the Franklin School of Science and Arts also attended, and a group of sixty came from the Temple University School of Medicine. The Woman's Medical College was also represented by a large group.

The museum is open daily with the exception of Saturdays and Sundays, from 9 A.M. to 1 P.M. and from 2 P.M to 4 P.M. On the monthly meeting nights when the lectures are called for 8:30 P.M., it is open until 7:30 P.M.

Dr. Worth B. Daniels, of Washington, D. C., came to the museum to see our collected material on the Siamese Twins, Chang and Eng Bunker, about whom he was writing. He had copies made of several prints in the Museum Scrapbook and other data that was on hand. He supplied us with information not in the museum files, among which is a copy of a letter written to a relative by a tin-smith, William Augustus Reich, describing his construction of a tin coffin for the twins. An article about this interesting coffin, written by the curator, appeared in the July 1962 issue of *Transactions & Studies of the College of Physicians of Philadelphia.*

A descendant of Eng, Mr. Joffre Bunker, also contacted the museum to obtain additional information to be used in a history of the life of the twins. This we gladly supplied.

As the museum now holds unacceptable duplicate instruments to be donated to other institutions or exchanged with them, it was able to donate seven instruments as gifts from the College for permanent exhibit in the operating room on board the Cruiser U.S.S. Olympia, Admiral Dewey's Flag Ship.

As gifts are now catalogued under College Collections so that they may be loaned upon request, the museum has no new accessions to report. However, these objects are exhibited in the museum.

Dr. Samuel X Radbill, as usual, brought the group of graduate students in pediatrics from the University of Pennsylvania to the museum. They were shown early surgical instruments and infant feeding bottles there, the display being augmented by those in Dr. Radbill's own large collection. This is always an interesting and interested group as many of them come from foreign countries and, surprisingly, find many of our old instruments new to them.

Mrs. Ella N. Wade was reappointed curator for the year 1962–1963.

College Collections

The Committee on College Collections furnished Dr. Lloyd E. Hawes of the Faulkner Hospital, in Boston, with photographs of early x-ray tubes in the collection, and permission was given Mrs. George E. Pfahler to have photographs made of early x-ray tubes used by Dr. George E. Pfahler.

Mr. Frank Ireland restored three of the College oil portraits, namely those of Caspar Wistar, Samuel Jackson, and John Rhea Barton. Because of illness in the early part of the year, time did not permit him to work on any others.

A number of gifts were accepted during the year by the Committee and Council.

Dr. Fred B. Rogers presented a hand-carved bone miniature human skull bought in Yokohama, Japan, in 1952, and two framed pictures—one an engraving made in 1813 from

the portrait of Benjamin Rush by Thomas Sully, the other a colored picture of an oil portrait of Albert Schweitzer done by A. Dubois in 1949.

From his collection of feeding boats and medicine spoons, *Dr. Samuel X Radbill* added a 19th century porcelain medicine spoon from upper New York State.

A medal of the Cleveland Medical Library Association was presented by *Dr. W. B. McDaniel 2d*, an Honorary Fellow of the Association.

Dr. J. Monroe Thorington presented three interesting bottles that once held, variously, "Dr. Wistar's Balsam of Wild Cherry for Consumption of the Lungs", "Dr. Kennedy's Rheumatic & Neuralgia Liniment", and "Renne's Pain-Killing Oil."

Dr. Thorington also contributed instruments once used by his father, Dr. James Thorington. They are Jenning's self-recording test for the detection of color blindness, a portable perimeter, and a variety of instruments for eye examination.

Three types of tips for duodenal drainage tubes, the Einhorn, Rehfuss and Lyon, were given by *Dr. Truman G. Schnabel*, together with an interesting case of pocket instruments, a schnapper, and a hypodermic syringe.

A Dare Haemoglobinometer from *Dr. Katharine R. Boucot*, and a medal of the Second International Congress of Neurological Surgery, held in Washington, D. C., in 1961, presented by *Dr. Francis Clark Grant*, completes the list of donations.

Mrs. Ella N. Wade was reappointed clerk-technician for the year 1962–1963.

A. Reynolds Crane, M.D., *Chairman*

Transactions of the Sections

SECTION ON GENERAL MEDICINE

22 October 1962

External Secretory Function of Pancreas in Diabetes Mellitus. William Y. Chey, M.D.,* Harry Shay, M.D.,* and Charles R. Shuman, M.D. (Discusser: C. Robert Tittle, Jr., M.D.) (*Abstract 1*, below)

The Effects of Diet and Diuretic Agents in Pregnancy Toxemias. T. Terry Hayashi, M.D.,* Phenkae Phitaksphraiwan, M.D.,* and J. Robert Willson, M.D.* (Discusser: Laurence G. Wesson, Jr., M.D.*) (*Abstract 2*, below)

A Study of Fibrinolysin Treatment of Thromboembolism. Harold L. Israel, M.D., George R. Fisher, M.D.,* Otto Mueller, M.D.,* and David A. Cooper, M.D. (Discusser: Truman G. Schnabel, Jr., M.D.) (*Abstract 3*, below)

Bilateral Symmetrical Gangrene Due to Venous Occlusion. Martin H. Wendkos, M.D. (Discusser: Norman Learner, M.D.) (*Abstract 4*, below)

26 November 1962

The Cytologic Diagnosis of Gastrointestinal Malignancy. C. Wilmer Wirts, M.D., Francis A. McKeon, M.D.,* Dennis S. O'Connor, M.D.,* and Franz Goldstein, M.D.* (Discusser: Henry J. Tumen, M.D.) (*Abstract 5*, below)

Ulceration and Perforation of the Intestine Due to Necrotizing Arteriolitis. Rodman B. Finkbiner, M.D., and John P. Decker, M.D. (Discusser: Gonzalo E. Aponte, M.D.*) (*Abstract 6*, below)

Surface Tension Reducing Activity in the Normal and Atelectatic Human Lung. Alton I. Sutnick, M.D.,* and Louis A. Soloff, M.D. (Discusser: Richard T. Cathcart, M.D.) (*Abstract 7*, below)

Some Causes of Reversible Renal Insufficiency. George D. Webster, Jr., M.D.,* (Discusser: Lewis W. Bluemle, Jr., M.D.*) (*Abstract 8*, below)

28 January 1963

Hematologic Complications of Renal Disease. Arthur J. Weiss, M.D.,* Marie A. Barr, M.T.,* Laird G. Jackson, M.D.,* and James E. Clark, M.D. (Discusser: Harold A. Wurzel, M.D.) (*Abstract 9*, below)

Disturbances of Indole Metabolism in Hepatolenticular Degeneration (Wilson's Disease). F. William Sunderman, Jr., M.D. (Discusser: Francis C. Dohan, M.D.) (*Abstract 10*, below)

Factitious Pheochromocytoma. Corine R. Overcamp, M.D., Harry Gottlieb, M.D., and Edward J. Huth, M.D. (Discusser: Alfred M. Sellers, M.D.) (*Abstract 11*, below)

Dialysis of the Small Bowel in Chronic Renal Failure. James E. Clark, M.D., and John Y. Templeton, III, M.D. (Discusser: George D. Webster, M.D.) (*Abstract 12*, below)

SECTION ON MEDICAL HISTORY

9 October 1962

History of the Founding of the Graduate School of Medicine, University of Pennsylvania. Paul Nemir, Jr., M.D.

Medieval Arabic Pharmacology. Martin Levey, Ph.D.* (*Transactions & Studies*, January 1963)

Robert Hamill Nassau (1835–1921): Apostle to Africa. Fred B. Rogers, M.D. (*Transactions & Studies*, January 1963)

Chronic Non-Hemolytic Jaundice (Gilbert's Disease): Historical Aspects. Frank P. Brooks, M.D.

8 January 1963

Michel Sarrazin (1659–1734): The Father of French Canadian Science. Roderick L. Tondreau, M.D.

* By invitation.

Caspar Wistar on Depression, 1786. William D. Sharpe, M.D.*

The Development of the National Library of Medicine. Gerard P. Smith, M.D.*

SECTION ON OPHTHALMOLOGY[1]

18 October 1962

Indications for Optical Aids in Subnormal Vision. Sidney Weiss, M.D.

Traumatic Recession of the Chamber Angle. Edwin U. Keats, M.D.*

Experimental Retinal Detachment. Fikret B. Mutlu, M.D.*

15 November 1962

Abducens Paresis. C. Wilbur Rucker, M.D.,* Mayo Clinic, Rochester, Minnesota (Twenty-fifth Annual de Schweinitz Lecture)

20 December 1962

Attitudinal Hemianopsia in Folic Acid Deficiency Anemia. Charles W. Simcoe, M.D.*

Hereditary Retinoschisis. Lov K. Sarin, M.D.,* William R. Green, M.D.,* and Edward Dailey, M.D.*

The Effects of Applied Ocular Pressure and of Positive Acceleration on Photic Driving in Man. Thomas D. Duane, M.D., James F. Toole, M.D., David H. Lewis, M.D., and S. Donald Weeks, M.D.*

17 January 1963

Pleoptics. Arthur Linksz, M.D.,* New York University College of Medicine.

21 February 1963

The Congenital Glaucomas. Robert N. Shaffer, M.D.,* University of California School of Medicine, San Francisco.

[1] Abstracts of the presentations at this Section customarily appear in the *American Journal of Ophthalmology* and *A.M.A. Archives of Ophthalmology.*

SECTION ON OTOLARYNGOLOGY[2]

14 November 1962

Vertigo Due to Causes Other Than Ménière's Disease Treated by Ultrasonic Radiation. Robert J. Wolfson, M.D.*

End Results and Treatment of Cancer of the Tonsil. Robert D. Harwick, M.D.,* and John V. Blady, M.D.

Electromyographic Observations on the Larynx in Health and Disease (motion picture). Joseph P. Atkins, M.D. (Joint Meeting of the Section of Otolaryngology, College of Physicians of Philadelphia, and the Philadelphia Laryngological Society.)

4 December 1962

Treatment of Carcinoma of the Maxilla with Immediate Reconstruction. Philip Von Frankel, M.D.*

Interpretation of Hearing Tests. Frederick Harbert, M.D.

Is Hoarseness Always A Reliable Sign of Carcinoma of the Larynx? William A. Lell, M.D. (Joint Meeting of the Section of Otolaryngology, College of Physicians of Philadelphia, and the Philadelphia Laryngological Society.)

5 February 1963

History of Tracheo-Bronchial Foreign Bodies. Louis H. Clerf, M.D. (First Jackson Memorial Lecture. Joint Meeting of the Section on Otolaryngology, College of Physicians of Philadelphia, and the Philadelphia Laryngological Society.)

SECTION ON PUBLIC HEALTH, PREVENTIVE AND INDUSTRIAL MEDICINE

13 November 1962

Epidemiology and Control of Lead Poisoning. Tom F. Whayne, M.D., DR. P.H., Emil

[2] Abstracts of the presentations at this Section customarily appear in the *A.M.A. Archives of Otolaryngology.*

A. Tiboni, M.P.H.,* Milton Werrin, V.M.D.,* and William M. Pallies, B.S.*

PRESENTATION OF WILLIAM HARVEY PERKINS PRIZE IV (MEDICAL STUDENT ESSAY CONTEST) TO CHARLES F. SMITH, B.S., AND DANIEL G. WITMER, B.S., University of Pennsylvania School of Medicine.

ABSTRACTS

Abstract 1

EXTERNAL SECRETORY FUNCTION OF PANCREAS IN DIABETES MELLITUS. William Y. Chey, M.D., Harry Shay, M.D. and Charles R. Shuman, M.D. Fels Research Institute and Department of Medicine, Temple University School of Medicine.

Whether changes in external pancreatic secretion can occur in diabetes mellitus has long been debated. Responses of serum amylase and lipase and of duodenal contents in the pancreozymin-secretin test were compared in 70 diabetic and 40 patients free of gastro-intestinal disease. In 50 hospitalized adult diabetics, selected by the method of randomization, 10 showed either elevated fasting serum enzyme values or an abnormal serum enzyme response after the hormones were injected, and 18 patients showed abnormal values in the duodenal contents. Similar abnormal duodenal findings were obtained in all 6 cases of juvenile diabetes. The most common abnormality was a low amylase output. Diabetic patients with unexplained abdominal symptoms, in whom other laboratory studies including gastro-intestinal x-ray revealed no abnormality, yielded a higher incidence of abnormal results with the pancreozymin-secretin test than did those without such symptoms. Exocrine pancreatic function was further evaluated in selected patients by starch tolerance, I^{131}-triolein tests, and stool examination for fat and undigested meat fiber. These results were discussed. Duration or severity of disease or complications in the diabetes with abnormal external pancreatic function were not different from those with normal function. Involvement of the islets of Langerhans in primary chronic disease of the acini (chronic relapsing pancreatitis) is well known: the reverse process apparently also can occur in diabetes.

Abstract 2

THE EFFECTS OF DIET AND DIURETIC AGENTS IN PREGNANCY TOXEMIAS. T. Terry Hayashi, M.D., Phenkae Phitaksphraiwan, M.D., and J. Robert Willson, M.D., Department of Obstetrics and Gynecology, Temple University School of Medicine.

Normal and toxemic pregnant patients were studied with regard to blood and urinary electrolytes under diuretic treatment with and without antihypertensive agents. Marked diuresis, naturesis, and chloresis were recorded. The elevation of the blood urea nitrogen was recorded in every case except when patients were given unusually high carbohydrate and low protein diet. The elevation of blood urea nitrogen in indigent clinic patients is secondary to a dietary change. There were no changes in uric acid excretion during the period of study.

Abstract 3

A STUDY OF FIBRINOLYSIN TREATMENT OF THROMBOEMBOLISM. Harold L. Israel, M.D., George R. Fisher, M.D., Otto Mueller, M.D., and David A. Cooper, M.D., Philadelphia General Hospital.

Two comparable medical services in a large general hospital have been used for a study of the value of fibrinolysin therapy. The conventional anticoagulant treatment given all patients with suspected thromboembolism and acute myocardial infarction was augmented in 149 cases by intravenous infusion of 400,000 to 800,000 units of a commercially available streptokinase-plasminmixture.

Consistent effects on blood coagulation were demonstrable with the larger dose, but only irregular effects with the smaller.

A slight decrease in mortality from initial episodes of pulmonary embolism appeared related to use of fibrinolysin. Anticoagulant

therapy alone was highly effective in reducing the frequency of secondary pulmonary embolism, and no additional advantage from use of fibrinolysin was demonstrable. Necropsy studies indicated some reduction in size of residual emboli and infarcts in fibrinolysin-treated cases, and the frequency of readmission with recurrent thromboembolic disease was greater in the control group.

The dosage zone providing consistent effects on blood coagulation without troublesome bleeding was narrow. Pyrogenic and anaphylactic reactions to fibrinolysin were infrequent and rarely severe, but four treated patients (3.6 percent of those discharged alive) developed hepatitis four to six months later.

The therapeutic advantage obtainable appears too small, and the risk of serum hepatitis too great, to warrant common clinical use of presently available fibrinolytic agents.

Abstract 4

Bilateral Symmetrical Gangrene Due to Venous Occlusion. Martin H. Wendkos, M.D., Veterans Administration Hospital, Coatesville, Pennsylvania.

A white male, 65 years of age at the time of his death at the Coatesville Veterans Administration Hospital, had been continuously confined to that institution since the age of 41 because of a chronic brain syndrome due to meningo-encephalitic syphilis of the central nervous system. He had suffered an attack of acute myocardial infarction when 62 years of age and had not developed any recurring cardiac complications afterward. One month before his death, a chest x-ray established the presence of a mediastinal tumor. Ten days before death, symmetrical bilateral gangrene of the lower extremities was observed. This complication was unassociated with loss of motor function, pain, lowered skin temperature, or loss of arterial pulsations in affected limbs; but it was associated with gradually increasing edema of the ankles and pre-tibial areas bilaterally. An ante-mortem diagnosis of bilateral deep venous thrombosis was confirmed at the autopsy. Additional pathologic findings included old myocardial infarction of the antero-septal portion of the left ventricle, adherent old mural thrombus of the left ventricle, aortic and coronary sclerosis, mediastinal cancer, bilateral nephrosclerosis, and old infarctions of the right kidney. The clinical and pathologic features were thought to be characteristic of the syndrome of "gangrene of the extremities of venous origin" described by Haimovici in 1950. A careful search of the medical literature indicated that there were no previously reported instances of simultaneous bilateral symmetrical gangrene ascribable to thrombotic occlusion of the deeper venous tributaries. In this instance, the unusual cause for acral gangrene was considered to be related to the hypercoagulable state associated with malignant disease and to the circulatory stasis accompanying bed rest, coronary artery disease, and old myocardial infarction.

Abstract 5

The Cytologic Diagnosis of Gastrointestinal Malignancy. C. Wilmer Wirts, M.D., Francis A. McKeon, M.D., Dennis S. O'Connor, M.D., and Franz Goldstein, M.D. Departments of Medicine and Pathology, Jefferson Medical College.

The cytologic method for the diagnosis of gastrointestinal cancer has been found reliable by a number of investigators, but its use has remained restricted to the larger medical centers. On the basis of a pilot study and of a subsequent combined two-year study by the Department of Pathology and the Division of Gastroenterology at Jefferson Medical Center, we feel that gastrointestinal cytology is a useful method which should supplement standard technics for the evaluation of patients with suspected neoplasm of the esophagus, stomach, colon, and biliary-pancreatic-duodenal zone. The procedure has great diagnostic value and is practical to employ in the community hospital if the services of a properly trained cytotechnician and cytopathologist are available.

Abstract 6

Ulceration and Perforation of the Intestine Due to Necrotizing Arteriolitis. Rodman B. Finkbiner, M.D., and John P. Decker, M.D., Gastrointestinal Research Laboratory and Ayer Clinical Laboratory, Pennsylvania Hospital.

During the past three years, three patients have been seen at the Pennsylvania Hospital with disseminated arteritis of varied etiology, which led to discrete ulceration, perforation, peritonitis, and death. The underlying diseases in the three cases was disseminated lupus erythematosus, rheumatoid arthritis, and polyarteritis nodosa. In contrast to the dramatic acute abdominal emergency that results from occlusion of the superior mesenteric artery, involvement of the smaller arteries and terminal arterioles results in a more insidious clinical picture that results in focal patchy, gangrenous changes that lead to ulceration and eventually to perforation. Intestinal infarction with perforation has not been reported previously in disseminated lupus erythematosus. There have been increasing numbers of reports of rheumatoid arthritis with associated intestinal arteritis which has been attributed by some to the use of corticosteroid medications. However, the development of intestinal arteritis in patients with rheumatoid arthritis was reported prior to the advent of corticosteroid therapy, and although the relationship of corticosteroid therapy to the development of intestinal arteritis is unsettled, it is probable that intestinal arteritis is merely a progression of the basic hypersensitivity state. The mesenteric arteries are frequently affected in polyarteritis nodosa, but frank infarction of the gastrointestinal tract occurs in only 6% of all cases. Ischemia, with or without ulceration, accounts for the frequently observed aggravation of pain by food, associated nausea, vomiting, and diarrhea. The diagnosis of intestinal arteriolitis with infarction of the gut is difficult. The x-ray changes in the small intestine, if present, are nonspecific and resemble those of regional enteritis. Many of the lesions seen at autopsy do not lend themselves to roentgenographic recognition. Demonstration of specific ulceration was not possible in any case reported here. Treatment is frequently unsatisfactory. The high mortality rate in this disease can be decreased by early surgical intervention achieved by a high index of suspicion if intestinal arteritis with infarction in patients known to have disseminated lupus erythematosus, rheumatoid arthritis, or polyarteritis nodosa. The combined use of adrenocortical and anticoagulant therapy has been reported to be successful. This rather bold medical approach remains to be confirmed. Surgical resection of the affected bowel has been successful in a few patients.

Abstract 7

Surface Tension Reducing Activity in the Normal and Atelectatic Human Lung. Alton I. Sutnick, M.D., and Louis A. Soloff, M.D., Department of Medicine, Temple University School of Medicine.

A lipoprotein substance which lines the alveolar membrane has come to assume considerable importance in respiratory mechanics by virtue of its ability to lower surface tension as surface area decreases. Studies of human lung tissue have been few, but have suggested that a deficiency of or an antagonist to this surfactant exists in the lungs of patients dying of pulmonary hyaline membrane disease, atelectasis neonatorum, and following prolonged extracorporeal perfusion. We have examined the surface activity of the lungs of 9 patients dying of various causes, who were found to have atelectatic lobes or segments. The atelectatic portions of the lungs were found to have a marked decrease in surface activity, while the non-atelectatic portions exhibited normal activity. Experimental atelectasis was produced in 4 dogs, both by compression and obstruction. Atelectasis was obvious within 45 minutes, and extracts showed a definite decrease in surface activity. This abnormality became more marked with the passage of time. Our observations suggest

that, in the adult human, these changes in the surfactant are a result of atelectasis itself, or of the mechanism causing atelectasis, rather than a basic etiologic mechanism.

Abstract 8

SOME CAUSES OF REVERSIBLE RENAL INSUFFICIENCY. George D. Webster, Jr., M.D., Graduate Hospital of the University of Pennsylvania.

The natural history of chronic renal disease is one of slow progression. Hence a rapid increase in the clinical or biochemical signs of renal insufficiency should suggest to the physician that some other factor, possibly correctible, may be superimposed on the basic renal disease. The most common of these is sodium depletion, either due to a restricted sodium diet or to the use of diuretic agents. The presence of sodium depletion is suggested by the absence of edema, decreased blood pressure, postural hypotension, and evidence of dehydration. Hyponatremia need not be present. Even in the absence of objective signs, a trial of sodium repletion may prove beneficial. Congestive heart failure, by causing a reduction in renal blood flow and glomerular filtration rate, also is a common factor. Again the diagnosis may not be obvious and a trial of digitalization, especially on the patient with edema, may result in improved renal function. Other common factors are acute pyelonephritis and urinary tract obstruction. Less common causes to be considered are an acute exacerbation of the underlying disease, exposure to nephrotoxic agents, too vigorous reduction in blood pressure by antihypertensive agents, hypercalcemia, and adrenal insufficiency. Diagnosis and correction of one of these abnormalities will frequently result in marked clinical or biochemical improvement in patients who too often are treated only symptomatically. These principles were illustrated by several clinical case histories.

Abstract 9

HEMATOLOGIC COMPLICATIONS OF RENAL DISEASE. Arthur J. Weiss, M.D., Marie A. Barr, M.T., Laird G. Jackson, M.D., and James E. Clark, M.D. Department of Medicine, Jefferson Medical College.

Coagulation studies were performed on 42 patients with severe renal disease, 24 of which had abnormal bleeding. Multiple defects were found involving primarily the first stage of coagulation. The major defects were thrombocytopenia and defective platelet function. Two individuals had a defect resembling AHG deficiency in that fresh plasma or aluminum hydroxide-absorbed fresh plasma was required to correct the defect. In one patient, this defect improved with improvement of the patient's renal status. In general, only poor correlation existed between the type and the degree of the defect and the severity of the bleeding. However, all individuals with severe thrombocytopenia, and/or silicone clotting times of over three hours had a generalized bleeding tendency.

Coagulation studies were performed before and after passage of blood through a twin coil artificial kidney or over a cation exchange resin. In general, minimal changes occurred in the measured coagulation factors. A moderate drop in platelet count was almost invariably seen. This returned to pre-treatment level within 48 hours. Fibrinogen also dropped, but never to a dangerous level. Abnormalities in the prothrombin complex were not found following the mechanical procedures, nor were fibrinolysins activated. First-stage coagulation factors could not be directly followed because these patients were heparinized; however, they did not require excessive amounts of heparin and generally their first-stage coagulation studies were back to their pretreatment level within 24 hours of completion of the mechanical procedure.

Abstract 10

DISTURBANCES OF INDOLE METABOLISM IN HEPATOLENTICULAR DEGENERATION (WILSON'S DISEASE). F. William Sunderman, Jr., M.D. Division of Metabolic Research, Department of Medicine, Jefferson Medical College.

Consistent elevations in the urinary excretion of 5-hydroxyindoleacetic acid (mean 34.0 ± 6.2 mg per 24 hours) were observed in a 35 year old patient with Wilson's disease. Thorough investigations, including surgical laparotomy, failed to demonstrate carcinoid tumor. Paper chromatographic fractionations of urinary indoles confirmed the increased excretion of 5-hydroxyindoleacetic acid and revealed, in addition, increased excretion of 5 - hydroxyindoleacetic acid - sulfate ester, indoleacetic acid, indoleacetylglutamine and tryptamine. Chromatographic fractionations of serum indoles demonstrated traces of 5-hydroxyindoleacetic acid, a metabolite which has not previously been detected in human serum. This is the second reported case of Wilson's disease with disturbances in indole metabolism. The present studies indicate that the disturbances in this patient involve not only the metabolites of 5-hydroxytryptophan, but also the corresponding nonhydroxylated metabolites. (These studies have been supported, in part, by contract with the Atomic Energy Commission.)

Abstract 11

FACTICIOUS PHEOCHROMOCYTOMA. Corine R. Overkamp, M.D., Harry Gottlieb, M.D., and Edward J. Huth, M.D. Department of Medicine, Woman's Medical College of Pennsylvania.

Malingering is an interesting problem, especially when the patient presents herself with symptoms of severe medical disease. A case of "facticious" pheochromocytoma is reported here.

This 35 year old Negro woman was referred to the medical clinic because of hypertension. During the clinic visit she became acutely ill with nausea, vomiting, profuse sweating, headache, chest pain, and marked elevation of blood pressure. She was admitted to the hospital for further study.

Past medical history included rheumatic fever and a history of headaches and hypertension since the age of 19. She had numerous past hospitalizations. Operative procedures included hysterectomy, cardiac catheterization, and incision of abscesses. Most observers considered that she had essential hypertension.

Physical examination revealed an obese Negro female in acute distress, sweating profusely. Fundoscopic examination showed only slight arterial narrowing. The thyroid was not enlarged. Tender lymph nodes were palpable in the left axilla. The heart was enlarged to the left anterior axillary line, with a Grade III pansystolic murmur at the apex radiating both to the axilla and along the left sternal border. She had rapid, shallow respirations with fine expiratory râles at both lung bases. The abdomen was soft, with multiple surgical scars. The liver edge was palpable 2 cm. below the right costal margin and was slightly tender. A draining abscess was present on the right buttock. There was no peripheral edema.

This patient was studied extensively. Urinary catecholamines were slightly above normal levels on five occasions, according to the method of Tse and Oesterling (1).

She had three more attacks of paroxysmal hypertension with headache, nausea, vomiting, and profuse sweating. However, histamine intravenously failed to produce either a clinical attack or an elevation of urinary catecholamines.

The clinical picture was so suggestive that, in spite of her obesity, negative histamine tests, and only slightly elevated urinary catecholamines, laparotomy was recommended. Presacral air studies and aortogram showed a suspicious area near the upper pole of the left kidney. Exploration was negative. Biopsy of the left adrenal revealed normal tissue. Planograms of the mediastinum were also normal.

She was not seen again until seven months later when she presented herself at the emergency room with a similar attack. On the third hospital day she became very lethargic and difficult to rouse. Neurologic examination detected no localizing signs. When roused by painful stimuli, she complained of severe chest pain which was relieved by placebo

injection. On the fourth hospital day she was found clutching a bottle of Tuinal. A search of her purse revealed numerous medications, including two empty vials of Aramine and a disposable syringe. After psychiatric consultation she was transferred to Philadelphia Psychiatric Center for further care.

A review of the medical literature revealed only one similar case. This case, in the Russian literature, reported the simulation of arterial hypertension with ephedrine (2). Some of the pitfalls of diagnosis of pheochromocytoma were discussed.

REFERENCES

1. Tse, R. L., and Oesterling, M. J.: A Sensitive Spectrophotometric Method for Adrenaline and Noradrenaline. Clin. Chim. Acta **4:** 307, 1959.
2. Skopin, I. V., Tatarinova, T. E., Freidman, S. L., and Bender, K. I.: Simulated Arterial Hypertension Produced with Large Doses of Ephedrine and Theophedrine. Ter. Arkh. **32:** 64, 1960.

Abstract 12

Dialysis of the Small Bowel in Chronic Renal Failure. James E. Clark, m.d., and John Y. Templeton, III, m.d. Department of Medicine, Jefferson Medical College.

Twelve patients with far-advanced uremia secondary to various forms of chronic renal disease are the subject of this paper. All twelve had segments of ileum or jejunum isolated from the remaining portion of the small intestine in one of three ways: (1) With both the proximal and distal ends exteriorized on the skin; (2) With the proximal and distal ends of the isolated segment reanastomosed to form a complete circle, this loop communicating to the surface of the skin with two nylon tubes (Redo gastrostomy tubes); and (3) The proximal end of the isolated segment exteriorized on the skin and the distal end anastomosed end-to-side into the isolated segment approximately nine inches from the proximal end. Dialyzing solutions were prepared using tap water, glucose, sodium chloride, and potassium chloride. The jejunum was used in nine patients. Clearance of urea and creatinine could be doubled or tripled by recirculation of fluid through a circular loop or via external tubes in the first type of loop. The concentration of urea and creatinine was greater in the dialysate from the loops than in peritoneal dialysate from the same patient compared in the same day. Clearances, however, were better in peritoneal dialysis because of the larger volume of fluid used. Net calcium transport was zero until vitamin D was added, which effected the removal of all detectable calcium within thirty minutes in these uremic patients. Mechanical problems of fluid recovery would indicate that the first type of loop described is preferable to the internal circles.

List of College Lectures, 1962

3 January 1962

POTTS, WILLIS J. The Story of Heart Surgery. (Nathan Lewis Hatfield Lecture XLVI.)

7 February 1962

MENNINGER, WILLIAM C. Mental Health—Everybody's Business. (S. Weir Mitchell Oration XVI; *Transactions & Studies*, July 1962.)

7 March 1962

BURNET, F. MACFARLANE. Immunological Specificity. (Hira S. Chouké Lecture IV; *Transactions & Studies*, July 1962.)

27 March 1962

SCHMIDT, CARL F. Some Experiences with Chinese Drugs. (Kate Hurd Mead Lecture XIV; *Transactions & Studies*, October 1962.)

4 April 1962

HOWARD, JOHN EAGER. Normal and Abnormal Function of the Parathyroids. (Mary Scott Newbold Lecture LXXXIII; *Transactions & Studies*, October 1962.)

16 May 1962

Joint Meeting of the Philadelphia County Medical Society and the College of Physicians of Philadelphia.

I. Presentation of the 39th Annual Strittmatter Award of the Philadelphia County Medical Society to Dr. T. Grier Miller by Dr. Charles M. Thompson, Chairman, Award Committee.

II. Presentation of citations to physicians who have completed fifty years in the practice of medicine. Citations awarded by Dr. Daniel H. Bee, President, The Medical Society of Pennsylvania.

3 October 1962

GIBBON, JOHN H., JR. Changing Concepts in the Therapy of Carcinoma of the Esophagus. (Alvarenga Prize Lecture XXII, *Transactions & Studies*, January 1963.)

24 October 1962

HINMAN, E. HAROLD. Current Status of Eradication of Infectious Diseases. (Arthur Parker Hitchens Lecture VII; *Transactions & Studies*, January 1963.)

31 October 1962

TALBOTT, JOHN H. S. Weir Mitchell. (S. Weir Mitchell Associates Lecture I; *Transactions & Studies*, April 1963.)

7 November 1962

BAUMGARTNER, LEONA. Widening Health Horizons. (James M. Anders Lecture XLII; *Transactions & Studies*, April 1963.)

5 December 1962

HENNEMAN, PHILIP H. Effects of Aspirin and Corticosteroids on Paget's Disease of Bone. (Benjamin Musser Lecture VIII; *Transactions & Studies*, July 1963.)

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Public Health, Preventive and Industrial Medicine

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Editor, Transactions & Studies

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Curator, Mütter Museum; Custodian, College Collections

Ella N. Wade

Superintendent

George S. Allen

Fellows

February 15, 1963

ELECTED

1952. Abelson, Neva Martin, 32 Woodale Rd. (18)
1961. Adamson, William C., The Woods Schools, Langhorne, Pa.
1926. Adler, Francis Heed, 313 S. 17th St. (3)
1959. Adlin, Albert, 1512 Lindley Ave. (41)
1949. Aegerter, Ernest E., 3400 N. Broad St. (40)
1953. Agerty, Horst A., 1111 N. 63rd St. (31)
1960. Ainsworth, Thomas H., Jr., 888 Glenbrook Ave., Bryn Mawr, Pa.
1963. Albright, Edwin P., 512 E. Mt. Airy Ave. (18)
1958. Alexander, John Deaver, Philadelphia General Hospital (4)
1962. Alexander, John Dewey, Jr., 330 S. 9th St. (7)
1932. Allen, Frederick H., 3915 Henry Ave. (29)
1953. Allman, David B., 104 St. Charles Pl., Atlantic City, N. J.
1935. Alpers, Bernard J., 111 North 49th St. (39)
1960. Ames, Mary D., 260 St. James Place. (6)
1961. Amsterdam, Gerald H., 1351 W. Tabor Rd. (41)
1962. Annesley, William H., Jr., 39 Glendale Road, Upper Darby, Pa.
1961. Anthony, Russell A., 385 Lancaster Ave., Haverford, Pa.
1961. Aponte, Gonzalo E., 1025 Walnut St. (7)
1930. Appel, Kenneth E., 111 N. 49th St. (39)
1905. Appelman, Leighton Francis, 308 S. 16th St. (2)
1960. Arey, James B., 2600 N. Lawrence St. (33)
1959. Arkless, Henry A., 255 S. 17th St. (3)
1922. Arnett, John H., 2116 Pine St. (3)
1952. Ash, Rachel, 255 S. 17th St. (3)
1952. Aston, Melville J., Garden Court Plaza, 47th & Pine Sts. (43)
1944. Atkins, Joseph P., 1201 Knox Rd., Wynnewood, Pa.
1956. Atkinson, John B., Chestnut & Copley Rds., Upper Darby, Pa.
1935. Atlee, John L., Jr., 37 E. Orange St., Lancaster, Pa.
1952. Atlee, William A., 37 E. Orange St., Lancaster, Pa.
1958. Ayella, Alfred S., Jr., 1213 S. Broad St. (47)
1960. Bacon, Catherine L., 504 Howe Rd., Merion Station, Pa.
1937. Bacon, Emily P., Lankenau Medical Bldg. (51)
1960. Bacon, Harry E., 255 S. 17th St. (3)
1958. Baer, Samuel, 5123 N. Broad St. (41)
1959. Baird, Henry Welles, III, 2600 N. Lawrence St. (33)
1952. Baier, Howard N., 3401 N. Broad St. (40)
1952. Baker, Howard W., 3401 N. Broad St. (40)
1946. Baker, Walter W., 255 S. 17th St. (3)
1958. Ball, Simon, 255 S. 17th St. (3)
1958. Ballinger, Walter F., II, 1025 Walnut St. (7)
1957. Baltzell, William Hewson, 1530 Locust St. (2)
1940. Barba, Philip S., 120 Erdenheim Road (18)
1943. Barden, Robert P., 8835 Germantown Ave. (18)
1961. Bare, Wesley W., 2400 S. 21st St. (45)
1939. Barnshaw, Harold D., 526 Cooper St., Camden 2, N. J.

1957. Barr, S. Stanley, 255 S. 17th St. (3)
1939. Bartle, Harvey, Jr., Glenbrook Medical Bldg., 864 County Line Rd., Bryn Mawr, Pa.
1932. Batson, Oscar V., 3926 Pine St. (4)
1921. Bauer, Edward L., Alden Park Manor (44)
1933. Bauer, John T., 312 E. Second St., Moorestown, N. J.
1939. Baumann, Frieda, R.D. 2, West Chester, Pa.
1963. Baxter, Donald W., Philadelphia General Hospital (4)
1930. Beardwood, Joseph T., Jr., 1201 Ansley Ave. (26)
1952. Bedrossian, E. Howard, 2027 Spruce St. (3)
1949. Beecham, Clayton T., 105 West School Lane (44)
1935. Beerman, Herman, 255 S. 17th St. (3)
1942. Behrend, Albert, 1018 Melrose Ave. (26)
1945. Behrend, Bernard, 5910 Greene St. (44)
1934. Behrend, Moses, Rittenhouse Claridge, 18th & Walnut St. (3)
1949. Beizer, Lawrence H., 419 South 19th St. (46)
1930. Belk, William Parks, 433 Owen Rd., Wynnewood, Pa.
1936. Bell, Benjamin Tertius, 1941 Woodland Rd., Abington, Pa.
1956. Beller, Martin Leonard, 1936 Spruce St. (3)
1947. Bellet, Samuel, 2021 Spruce St. (3)
1956. Belmont, Owen, 5723 No. Park Ave. (41)
1959. Berk, Nathaniel G., 2534 W. Cheltenham Ave. (50)
1941. Bernstein, Mitchell, 2053 S. John Russell Circle (17)
1951. Bernstine, J. Bernard, 255 S. 17th St. (3)
1960. Bernstine, Melvin Lewis, 1543 Marmont Lane, Los Angeles 46, Cal.
1956. Berry, Theodore J., 331 E. Lancaster Ave., Wynnewood, Pa.
1957. Biele, Albert M., 1530 Locust St. (2)
1918. Billings, Arthur E., 2020 Spruce St. (3)
1952. Bird, Gustavus C., Jr., 3401 N. Broad St. (40)
1957. Birdsall, Thomas M., 255 S. 17th St. (3)
1949. Bishop, Edward H., 811 Spruce St. (7)
1933. Bishop, Paul A., 1347 Waverly Rd., Gladwyne, Pa.
1944. Blady, John V., Parkway House, 2201 Benjamin Franklin Pkwy. (30)
1960. Blake, Alton D., Jr., Bryn Mawr Medical Bldg., Bryn Mawr, Pa.
1952. Blake, Paul O., 273 N. Lansdowne Ave., Lansdowne, Pa.
1958. Blakemore, William S., 3400 Spruce St. (4)
1917. Block, Frank B., A1124 Park Drive Manor (44)
1957. Block, Louis H., 1351 Tabor Rd. (41)
1949. Blumstein, George I., 2039 Delancey St. (3)
1929. Bockus, Henry L., 250 S. 18th St. (3)
1962. Boggs, Thomas R., Jr., Children's Hospital, 1740 Bainbridge St. (46)
1928. Boles, Russell S., Rittenhouse Plaza, 1901 Walnut St. (3)
1923. Bond, Earl D., 111 N. 49th St. (39)
1961. Bongiovanni, Alfred M., 1740 Bainbridge St. (46)
1948. Bookhammer, Robert S., 209 Rittenhouse Claridge (3)
1931. Bortz, Edward Le Roy, 2021 W. Girard Ave. (30)
1936. Bostwick, Delazon Swift, 106 Linwood Ave., Ardmore, Pa.
1928. Bothe, Frederick A., Wynnewood Plaza, Wynnewood, Pa.
1951. Boucot, Katharine R., Woman's Medical College (29)
1947. Bourland, Henry S., 2219 Garret Rd., Drexel Hill, Pa.
1961. Bouzarth, William F., 419 S. 19th St. (46)
1961. Bove, Frank A., 2301 Pennsylvania Ave. (30)
1954. Bowers, Paul A., 2031 Locust St. (3)

1942. Bowie, Morris A., Bryn Mawr Medical Bldg., Bryn Mawr, Pa.
1954. Bralow, S. Philip, 3701 N. Broad St. (40)
1942. Branen, William T., Whitby & Cypress Aves., Yeadon, Pa.
1921. Bransfield, John W., 2031 Locust St. (3)
1948. Braun, William, 406 Cooper St., Camden, N. J.
1953. Brav, Solomon S., 5575 N. Park Ave. (41)
1953. Breckenridge, Robert L., Our Lady of Lourdes Hosp., 1600 Haddon Ave., Camden 3, N. J.
1961. Breslow, Irwin H., 419 S. 19th St. (46)
1946. Briscoe, Clarence Conway, 811 Spruce St. (7)
1953. Brobeck, John R., Univ. of Pa. School of Medicine (4)
1958. Brody, Henry, Einstein Medical Center, York & Tabor Rds. (41)
1952. Brody, Morris W., 1930 Chestnut St. (3)
1948. Brogan, Edmund J., 1020 Cedargrove Rd., Wynnewood, Pa.
1953. Brooke, John A., 1431 Spruce St. (2)
1958. Brooks, Frank P., Hospital of the Univ. of Pa. (4)
1936. Brown, Clark E., Lancaster Ave. & City Line Ave. (51)
1932. Brown, Claude P., 1930 Chestnut St. (3)
1961. Brunt, Manly Y., 111 N. 49th St. (39)
1939. Brust, Raymond M., 4710 Chester Ave. (43)
1953. Bucher, Robert M., 3401 N. Broad St. (40)
1961. Buerk, Minerva S., Bryn Mawr Medical Bldg., Bryn Mawr, Pa.
1952. Bumgardner, Heath D., 3701 N. Broad St. (40)
1962. Burgoon, Carroll F., Jr., 804 Pine St. (7)
1940. Burnett, W. Emory, 3401 N. Broad St. (40)
1962. Burney, Leroy E., 3400 N. Broad St. (40)
1954. Burros, Harry M., 419 S. 19th St. (46)
1941. Butler, Miriam, Watersmeet, Glen Mills, Pa.
1957. Butterworth, Thomas, 411 Walnut St., Reading, Pa.
1957. Calhoun, John Alfred, Jr., 214 Elm Ave., Swarthmore, Pa.
1958. Cameron, Charles S., 235 N. 15th St. (2)
1962. Camishion, Rudolph C., 1025 Walnut St. (7)
1928. Campbell, Edward H., 133 S. 36th St. (4)
1952. Campbell, Edward W., Abington Memorial Hospital
1944. Campion, Richard J., Box 136 Springhouse, Ambler, Pa.
1960. Cancelmo, John B., 502 East Marshall St., West Chester, Pa.
1931. Cantarow, Abraham, 1025 Walnut St. (7)
1952. Cardone, John B., 831 N. 63rd St. (31)
1935. Carey, Lawrence S., 330 S. 9th St. (7)
1931. Cariss, Walter L., 51 N. 39th St. (4)
1956. Carnwath, John Wallace, Summit & Highland Aves., Jenkintown, Pa.
1930. Carpenter, Chapin, 1930 Chestnut St. (3)
1959. Carrington, Elsie R., Woman's Medical College (29)
1960. Carroll, Robert T., 1015 Sansom St. (7)
1917. Carson, John B., Newton Square, Pa.
1956. Carty, James Byron, 51 Hampden Rd., Upper Darby, Pa.
1956. Casey, Paul R., 8350 Roosevelt Blvd. (15)
1937. Castallo, Mario A., 1621 Spruce St. (3)
1943. Castigliano, S. Gordon, 853 Mt. Pleasant Rd., Bryn Mawr, Pa.
1949. Caswell, H. Taylor, 3401 N. Broad St. (40)
1954. Catenacci, Alfred J., 1417 S. Broad St. (47)
1954. Cathcart, Richard T., Jefferson Hospital, 1025 Walnut St. (7)
1957. Cattie, Vincent J., The Benson, E. 207A., Jenkintown, Pa.

1950. Chamberlain, Richard H., 3400 Spruce St. (4)
1939. Chamberlin, George W., Reading Hospital, Reading, Pa.
1900. Chance, Burton, 9 Llanalew Road, Haverford, Pa.
1945. Chance, Burton, Jr., 8236 Germantown Ave. (18)
1958. Channick, Bertram J., 3701 N. Broad St. (40)
1954. Charny, Charles W., 2039 Delancey Pl. (3)
1960. Chirico, Anna-Marie, Hosp. of Univ. of Pa. (4)
1947. Chouké, Kehar S., P. O. Box 5447, Kecoughtan Station, Hampton, Va.
1945. Cianfrani, Theodore, 1930 Chestnut St. (3)
1939. Ciccone, Emmet F., 2021 Murray St. (15)
1960. Cinquino, Mario A., 1518 S. Broad St. (46)
1960. Clader, Stanley C., 825-A Glenbrook Ave., Bryn Mawr, Pa.
1951. Clagett, Augustus H., Jr., 1618 N. Broom St., Wilmington 6, Del.
1929. Clark, Eliot R., 315 S. 41st St. (4)
1962. Clark, James E., 1015 Chestnut St. (7)
1951. Clark, John K., 36th & Spruce Sts. (4)
1947. Clark, Thomas Williams, 218 W. Chestnut Hill Ave. (18)
1947. Classen, Charles H., Cushman Rd. and Lancaster Ave., Rosemont, Pa.
1958. Closson, Edward W., 2320 S. Broad St. (45)
1910. Cloud, J. Howard, 111 St. Pauls Road, Ardmore, Pa.
1949. Cohen, Louis B., 1320 Arrott St. (24)
1953. Cohen, Robert V., 520 Spring Ave., Elkins Park 17, Pa.
1934. Collins, Leon Howard, Jr., 133 S. 36th St. (4)
1943. Colonna, Paul C., 133 S. 36th St. (4)
1949. Conger, Kyril B., 3401 N. Broad St. (40)
1961. Coon, Juluis M., 1025 Walnut St. (7)
1945. Coonel, Pauline, 47 E. Mt. Pleasant Ave. (19)
1930. Cooper, David A., 1520 Spruce St. (2)
1953. Cooper, Donald R., Woman's Medical College, 3300 Henry Ave. (29)
1960. Cooper, Edward Sawyer, 6710 Lincoln Drive (19)
1947. Coppolino, John F., 1807 S. Broad St. (45)
1952. Corbit, John D., Jr., 3717 Chestnut St. (4)
1959. Cormeny, George F., 3818 Chestnut St. (4)
1941. Cornelius, Chalmers E., 119 Summit Ave., Jenkintown, Pa.
1911. Cornell, Walter S., Board of Public Education, Parkway and 21st St. (3)
1914. Corson, Edward F., 136 S. 16th St. (2)
1946. Costello, Thomas J., 825 Glenbrook Ave., Bryn Mawr, Pa.
1924. Cowan, Alfred, 1930 Chestnut St. (3)
1940. Cowan, Thomas H., 1930 Chestnut St. (3)
1947. Crane, A. Reynolds, Pennsylvania Hospital (7)
1937. Crane, Martin P., 4701 Pine St. (43)
1952. Crellin, J. Antrim, 1930 Chestnut St. (3)
1955. Crist, Walter A., 211 N. 5th St., Camden, N. J.
1921. Crossan, Edward T., Buttonwood Hall, Conshohocken, Pa.
1937. Crump, Jean, 662 North Pottstown Pike, Exton, Pa.
1959. Cullen, Milton L., 1321 W. Tabor Rd. (41)
1962. Cunningham, John D., 3400 Spruce St. (4)
1934. Custer, R. Philip, 643 Moreno Road, Narberth, Pa.
1958. D'Alonzo, Walter A., 1647 S. 15th St. (45)
1938. Dannenberg, Arthur M., Sr., 235 S. 15th St. (2)
1950. Dannenberg, Arthur M., Jr., Henry Phipps Institute, Univ. of Pa. (4)
1951. Daugherty, Earl A., 2818 W. Girard Ave. (30)

1953. Davie, John H., 37 S. 20th St. (3)
1947. Davis, C. Nelson, Malvern Institute, Malvern, Pa.
1936. Davis, David M., 208 Haverford Sq. Bldg., Haverford, Pa.
1957. Davis, John Evan, Tedwyn Apts., 840 Montgomery Ave., Bryn Mawr, Pa.
1951. Davis, J. Wallace, 135 S. 18th St. (3)
1961. Dawber, Bryan A., Penn Mutual Life Insurance Co. (5)
1935. Deaver, J. Montgomery, Lankenau Medical Bldg. (51)
1957. Decker, John Paul, Pennsylvania Hospital (7)
1957. Dees-Porch, Frances, Glendale Road & Chestnut Sts., Upper Darby, Pa
1947. Dehne, Theodore L., Adams Avenue and Roosevelt Blvd. (24)
1935. Deibert, Irvin Elmer, 538 Cooper St., Camden, N. J.
1958. Deitz, George W. III, 1146 Arrott St. (24)
1955. De Long, Samuel L., 860 Lancaster Ave., Bryn Mawr, Pa.
1952. DeLuca, Charles Q., 255 S. 17th St. (3)
1952. De Orsay, Ralph H., 1241 Lindale Ave., Drexel Hill, Pa.
1951. De Palma, Anthony F., 248 S. 21st St. (3)
1959. DeTuerk, John J., 1930 Chestnut St. (3)
1928. Dewees, A. Lovett, 307 North Princeton Ave., Swarthmore, Pa.
1959. Dickens, Helen O., P. O. Box 9336 (39)
1958. Dickstein, Benjamin, 6810 Castor (24)
1956. Dietrich, Herbert James, Jr., 1830 Delancey Place (3)
1952. Diglio, Victor A., 2200 St. James Place (17)
1960. Dinon, Louis R., 330 S. 9th St. (7)
1920. Doane, Joseph C., 617 W. Hortter St. (19)
1948. Dohan, Francis Curtis, 80 Princeton Road, Cynwyd, Pa.
1954. Donaldson, James B., 1901 Walnut St. (3)
1946. Donnelly, Andrew J., 33rd and Powelton Ave. (4)
1933. Donnelly, Joseph C., 7955 Castor Ave. (15)
1937. Donnelly, Robert T. M., 5205 N. Broad St. (41)
1962. Dorman, Philip J., Fidelity Mutual Life Insurance Co. (1)
1954. Downing, Daniel F., 8864 Norwood Ave. (18)
1952. Drayer, Calvin S., 111 N. 49th St. (39)
1949. Dripps, Robert D., 3400 Spruce St. (4)
1956. Dubin, Isadore N., Woman's Medical College (29)
1944. Dublin, George J., 1930 Chestnut St. (3)
1944. Dugger, John H., Episcopal Hospital (25)
1935. Duncan, Garfield G., 330 S. 9th St. (7)
1953. Dupler, Donald A., 4028 Walnut St. (4)
1942. Durant, Thomas M., 3401 N. Broad St. (40)
1947. Durkin, John Keenan, 49 Woodcroft Rd., Havertown, Pa.
1942. Dyer, W. Wallace, Bryn Mawr Medical Bldg., Bryn Mawr, Pa.
1962. D'Zmura, Thomas L., 3401 N. Broad St. (40)
1936. Easby, Mary Hoskins, R. D. 1, Burlington, Vt.
1948. Eaton, Francis H., 4007 Chestnut St. (39)
1937. Edeiken, Joseph, 2130 Delancey Pl. (3)
1944. Eger, Sherman A., 255 S. 17th St. (3)
1944. Erhich, William E., 540 W. Hortter St. (19)
1956. Eiman, John W., Abington Memorial Hospital, Abington, Pa.
1962. Eisenberg, Samuel W., 3536 N. Broad St. (40)
1959. Eisenhower, James S. D., Jr., 2704 Pacific Ave., Wildwood, N. J.
1958. Eisman, Sylvan H., 3600 Spruce St. (4)
1946. Elfman, Louis Kenneth, 6330 Lebanon Avenue (31)

1959. Elias, Elmer J., 55 Frederick Place, Morristown, N. J.
1949. Elkinton, J. Russell, Oak Lane, Moylan, Pa.
1961. Elliott, Frank A., 807 Spruce St. (7)
1957. Ellis, Richard A., 1711 Rittenhouse Square (3)
1955. Ellis, Samuel, 541 S. 46th St. (43)
1939. Ellis, Van Mashburn, 1528 Spruce St. (2)
1928. Ellison, Richard T., 8601 Stenton Ave. (18)
1936. Ellson, J. Vernon, Glendale Road & Chestnut St., Upper Darby, Pa.
1937. Elsom, Kendall A., Scott Paper Co. (13)
1932. Engel, Gilson C., Lankenau Medical Bldg. (51)
1945. English, O. Spurgeon, 3401 N. Broad St. (40)
1942. Erb, William H., 133 S. 36th St. (4)
1957. Erdman, William James, II, 3400 Spruce St. (4)
1950. Ersner, Matthew S., 1915 Spruce St. (3)
1957. Etzl, Michael M., 9025 Frankford Ave. (14)
1954. Evans, William W., Box 2, Bryn Mawr, Pa.
1948. Everts, Glenn S. 5515 Wissahickon Ave., Apt. D-403 (44)
1955. Eynon, Harold K., Route 70 at East Gate, Barclay Farm, Haddonfield, N. J.
1946. Farell, David M., 1912 Spruce St. (3)
1903. Farr, Clifford B., Railroad Ave. & County Line Rd., Bryn Mawr, Pa.
1945. Farrar, George Elbert, Jr., 528 Scott Rd., Gladwyne, Pa.
1953. Farrell, Harry L., 1930 Chestnut St. (3)
1930. Farrell, John T., Jr., 255 S. 17th St. (3)
1935. Ferguson, Lewis Kraeer, 419 S. 19th St. (46)
1936. Fetter, Ferdinand, 322 S. 21st St. (3)
1945. Fetter, John S., 842 Worrell Rd., Jenkintown, Pa.
1935. Fetter, Theodore R., 255 S. 17th St. (3)
1924. Fewell, Alexander G., 135 South 18th St. (3)
1952. Fields, Harry, 133 S. 36th St. (4)
1959. Fineberg, Charles, 255 S. 17th St. (3)
1955. Finestone, Albert J., 3701 North Broad St. (40)
1960. Finkbiner, Rodman B., 811 Spruce St. (7)
1943. Finkelstein, Arthur, K. Graduate Hospital (46)
1955. Finkelstein, David, 419 S. 19th St. (46)
1955. Finley, John K., 527 Welsh St., Chester, Pa.
1954. Finn, Joseph L., 8014 Burholme Ave. (11)
1947. First, Arthur, 1714 Spruce St. (3)
1960. First, Howard E., 1714 Spruce St. (3)
1954. Fischer, Carl C., Girard College (21)
1950. Fischer, H. Keith, 100 W. Coulter St. (44)
1962. Fisher, George R., III, 801 Spruce St. (7)
1958. Fisher, Robert M., 118 Airdale Rd., Rosemont, Pa.
1956. Fite, Franklin K., Germantown Hospital (44)
1952. Fitts, William T., Jr., 3400 Spruce St. (4)
1928. Fitz-Hugh, Thomas, Jr., 2016 Delancey Pl. (3)
1952. Flexner, Louis B., 248 Anatomy-Chemistry Bldg., Univ. of Pa. (4)
1928. Flick, John B., 819 Black Rock Rd., Gladwyne, Pa.
1954. Flick, John B., Jr., Bryn Mawr Medical Bldg., Bryn Mawr, Pa.
1952. Flinn, Lewis B., 1306 Broom St., Wilmington, Del.
1939. Flippin, Harrison F., Lankenau Hospital (51)
1957. Forman, Simon B., 255 S. 17th St. (3)
1957. Fornwalt, George R., Brandon Road & Ludlow St., Upper Darby, Pa.

1954. Forster, H. Walter, Jr., 37 S. 20th St. (3)
1960. Foulger, John H., 601 Rockwood Rd., Wilmington, Del. (2)
1941. Fox, C. Calvin, 1806 Spruce St. (3)
1957. Frankel, Donald S., 255 S. 17th St. (3)
1959. Frankel, Kalman, 111 N. 49th St. (39)
1955. Frayer, William C., 37 S. 20th St. (3)
1941. Frazier, William Doane, 419 Gilpin Rd., Narberth, Pa.
1952. Freed, Herbert, 255 S. 17th St. (3)
1956. Freeman, Joseph T., 8-A Rittenhouse Plaza (3)
1958. Freiwald, Milton J., 222 S. 19th St. (3)
1953. Fried, Paul H., 1812 Spruce St. (3)
1955. Friedenberg, Zachary B., 133 S. 36th St. (4)
1951. Friedman, Paul Sigmund, 1422 Chestnut St. (2)
1960. Friedmann, Sidney, 1740 Bainbridge St. (46)
1958. Frisch, Frederick, 888 Glenbrook Ave., Bryn Mawr, Pa.
1937. Fritz, Herbert H., Pennswood Rd., Bryn Mawr, Pa.
1961. Frobese, Alfred S., 419 S. 19th St. (46)
1953. Fruchter, Joseph M., 220 Benjamin Franklin Parkway, Park Towne, North (30)
1940. Fry, Kenneth E., 1719 Rittenhouse Sq. (3)
1935. Fry, Wilfred Eyles, 1930 Chestnut St. (3)
1937. Furlong, Thomas F., Jr., Times Medical Building, Ardmore, Pa.
1954. Gambescia, Joseph M., 1422 Race St. (2)
1935. Gammon, George D., 2215 Fuller Rd., Ann Arbor, Michigan
1951. Garlichs, Richard W., 216 N. Monoa Road, Havertown, Pa.
1931. Garner, Vaughn C., 447 East Wadsworth St. (19)
1953. Garnet, James D., 807 Spruce St. (7)
1959. Gartland, John J., 269 S. 19th St. (3)
1950. Garvin, Eugene J., 533 S. 46th St. (43)
1953. Geckeler, Edwin O., 269 S. 19th St. (3)
1952. Gefter, William I., 1900 Rittenhouse Square (3)
1935. Geist, Donald C., 301 E. City Line, Bala-Cynwyd, Pa.
1955. Gelfand, David, 1722 Pine St. (3)
1954. German, George B., 429 Cooper St., Camden, N. J.
1941. Gershon-Cohen, J., 255 S. 17th St. (3)
1959. Gerson, Irvin M., 1561 E. Tulpehocken St. (38)
1955. Gettes, Bernard C., 128 Overhill Rd., Cynwyd, Pa.
1934. Gibbon, John H., Jr., 1025 Walnut St. (7)
1939. Gibson, Glen Gregory, 2031 Locust St. (3)
1944. Gifford, Edward S., Jr., 1913 Spruce St. (3)
1956. Gilbert, Philip D., Cooper Hospital, Camden, N. J.
1947. Giletto, Basil J., 2020 Locust St. (3)
1940. Gill, A. Bruce, 1603 Normandy Drive, Mt. Dora, Fla.
1955. Gill, Robert J., 801 Spruce St. (7)
1922. Gilmour, William R., 6616 Woodland Ave. (42)
1952. Gilpin, Sherman F., Jr., 1023 Buery Building, 3701 N. Broad St. (40)
1949. Ginsburg, Isadore W., 3401 N. Broad St. (40)
1958. Girsh, Leonard S., 3701 N. Broad St. (40)
1954. Gislason, Gerhard J., 136 S. 16th St. (2)
1962. Gold, David A., 5587 N. Park Ave. (41)
1962. Gold, Paul A., 5587 N. Park Ave. (41)
1956. Goldberg, Harry, 7913 Rolling Green Rd., Cheltenham, Pa.
1958. Golub, Leib J., 136 S. 16th St. (2)

1956. Goracci, Armando F., 2040 Poplar St. (30)
1937. Gordon, William, 5345 Spruce St. (39)
1956. Gouley, Benjamin, 5577 N. Park Ave. (41)
1957. Grahn, Henry Victor, 5132 Chester Ave. (43)
1926. Grant, Francis Clark, 750 Germantown Pike, Lafayette Hill, Pa.
1958. Greco, Toby A., 2506 S. 20th St. (45)
1940. Greene, Lloyd B., 803 Spruce St. (7)
1952. Greening, Roy R., Dept. of Radiology, Jefferson Hospital (7)
1958. Greenspan, Benjamin, 1319 W. Tabor Rd. (41)
1955. Greenstein, Raphael H., 1710 Pine St. (3)
1941. Groff, Robert A., Univ. of Pa. Hospital (4)
1952. Grotzinger, Paul J., 2121 Valley Rd., Huntingdon Valley, Pa.
1952. Grove, D. Dwight, 230 N. Broad St. (2)
1945. György, Paul, Univ. of Pa. School of Medicine (4)
1935. Hadden, Samuel B., 250 S. 18th St. (3)
1951. Hafkenschiel, Joseph H., Jr., 13 St. Asaph Rd., Bala-Cynwyd, Pa.
1945. Hahn, George A., 255 S. 17th St. (3)
1955. Hallahan, John D., 104 W. Front St., Media, Pa.
1951. Hallett, Joseph W., 136 S. 16th St. (2)
1961. Hammett, Van Buren O., 111 N. 49th St. (39)
1959. Hampton, Louis J., 1025 Walnut St. (7)
1954. Hand, B. Marvin, 1801 Pennsylvania Blvd. (3)
1938. Hand, John G., 1724 Pine St. (3)
1947. Hanes, William James, 218 E. Beechtree Lane, Wayne, Pa.
1950. Hansen, A. Victor, 910 Centennial Rd., Penn Valley, Pa.
1957. Harasym, Emil L., 5416 North 5th St. (20)
1956. Harbert, Frederick, Jefferson Hospital (7)
1952. Harer, W. Benson, State Rd. & Rogers Ave., Bywood, Pa.
1951. Harkins, Herbert P., 1930 Chestnut St. (3)
1962. Harris, James R., Philadelphia General Hospital (4)
1959. Harris, James S. C., 5401 Wayne Ave. (44)
1932. Harris, Stanley E., 229 Maple Ave., Delanco, N. J.
1948. Harris, T. N., 5112 Woodbine Ave. (31)
1929. Harrison, Francis G., 1900 Spruce St. (3)
1926. Hartmann, Fred I., 1914 Pine St. (3)
1946. Harvey, Edith E., 406 York Rd., Jenkintown, Pa.
1947. Harvey, Rolfe Marsh, 669 Mill Rd., Villanova, Pa.
1961. Harvie, Fred H., 3400 Spruce St. (4)
1935. Haskell, Benjamin F., 1427 Spruce St. (2)
1958. Haupt, George J., Lankenau Medical Bldg. (51)
1960. Hausman, David H., Pennsylvania Hospital, 8th & Spruce Sts. (7)
1947. Havens, Walter Paul, Jr., 139 Cheswold Lane, Haverford, Pa.
1952. Hayllar, Benjamin L., 803 Spruce St. (7)
1961. Hayward, Malcolm L., 111 N. 49th St. (39)
1961. Heath, Frederick K., Merck, Sharp and Dohme, West Point, Pa.
1957. Hedges, Thomas R., Jr., 330 South 9th St. (7)
1961. Heggestad, Gilman E., Bryn Mawr Medical Bldg., Bryn Mawr, Pa.
1953. Henny, George C., 3400 N. Broad St. (40)
1944. Herbut, Peter A., Dept. of Pathology, Jefferson Medical College Hospital (7)
1954. Herron, James R., 1486 Haddon Ave., Camden 3, N. J.
1957. Hess, Catherine B., 338 E. Gowan Ave. (19)
1949. Heyl, W. Meredith, 100 W. Coulter St. (44)

1956. Hildreth, Eugene A., University of Penna. Hospital (4)
1961. Hilferty, Daniel J., Jr., Wildman Arms Apts., Lansdowne, Pa.
1952. Hinkson, DeHaven, 329 N. 40th St. (4)
1962. Hinman, E. Harold, 1025 Walnut St. (7)
1924. Hirst, John C., 2d., 1821 Spruce St. (3)
1943. Hitschler, William J., Bethlehem Pike & Summit (18)
1944. Hneleski, Ignatius S., 802 S. 48th St. (43)
1943. Hockaday, Agnes, 316 Shadeland Ave., Drexel Hill, Pa.
1939. Hodes, Philip J., Dept. of Radiology, Jefferson Medical College (7)
1947. Hodges, John H., 1025 Walnut St. (7)
1959. Hoffman, Francis H., 3401 N. Broad St. (40)
1948. Hoffman, George L., Jr., 133 S. 36th St. (4)
1954. Hollander, George, 3500 Vista St. (36)
1949. Hollander, Joseph L., 36th & Spruce Sts. (4)
1951. Hollis, Charles B., 28 W. School Lane (44)
1952. Holloway, Edward E., 1736 Pine St. (3)
1949. Hopkins, Henry U., Garden Court Plaza, 47th & Pine Sts. (43)
1953. Horan, Charles A., 734 N. 63rd St. (31)
1946. Horan, Gerald W., Marple-Newtown Medical Bldg., Newtown Square, Pa.
1947. Horwitz, Orville, Hospital of University of Pa. (4)
1950. Houlihan, Carl T., 207 McClatchy Bldg., Upper Darby, Pa.
1944. Houlsel, Edmund L., 255 S. 17th St. (3)
1928. Houser, Karl Musser, 2035 Delancey Pl. (3)
1958. Howard, John M., 230 N. Broad St. (2)
1948. Howland, Alvin Wilcox, 255 S. 17th St. (3)
1946. Howson, John Yeatts, 316 Lancaster Ave., Wayne, Pa.
1951. Hubbard, John P., University of Pennsylvania School of Medicine (4)
1947. Huber, John Franklin, Temple University School of Medicine (40)
1937. Hughes, Joseph, 111 N. 49th St. (39)
1939. Hughes, P. Boland, 419 Hillbrook Rd., Bryn Mawr, Pa.
1951. Hundley, J. Warren, 3818 Chestnut St. (4)
1954. Hunsicker, William C., Jr., 255 S. 17th St. (3)
1946. Hunt, William T., Jr., 6 Penn Center Plaza (3)
1921. Hunter, Robert John, 928 N. 63rd St. (31)
1952. Hyman, Harold L., 3401 N. Broad St. (40)
1950. Imbriglia, Joseph E., 329 Shadeland Ave., Drexel Hill, Pa.
1949. Ingraham, Norman R., Jr., Stenton and Whitemarsh Aves. (18)
1957. Isaacson, Howard, Haverford Ave. & Drexel Rd.
1951. Isard, Harold J., Albert Einstein Medical Center, 5th & Reed Sts. (47)
1951. Israel, Harold L., 304 S. 19th St. (3)
1947. Israel, S. Leon, 807 Spruce St. (7)
1947. Jaeger, Rudolph, Jefferson Bldg., 1015 Chestnut St. (7)
1941. Jeffers, William A., 503 Owen Road, Wynnewood, Pa.
1960. Jenson, William K., 330 S. 9th St. (7)
1943. Johnson, Julian, 3400 Spruce St. (4)
1959. Johnson, Robert G., 1012 Walnut St. (7)
1938. Johnson, Thomas A., 135 S. 18th St. (3)
1952. Jonas, Karl C., 2601 Parkway (30)
1957. Jordan, Luke W., 1486 Haddon Ave., Camden 3, N. J.
1963. Joseph, Rosaline R., 3401 N. Broad St. (40)
1961. Joyner, Claude R., Jr., 3400 Spruce St. (4)
1957. Kacher, Leon, 2037 Pine St. (3)

1957. Kane, Sydney H., 3458 Cottman Ave. (49)
1948. Kaplan, Louis, 2040 Pine St. (3)
1938. Kasper, Kelvin A., 135 S. 18th St. (3)
1958. Kasser, Max D., 37 S. 20th St. (3)
1945. Katz, G. Henry, 111 N. 49th St. (39)
1958. Katz, Jacob, 136 S. 16th St. (2)
1941. Kauffman, M. Luther, Medical Arts Bldg., Jenkintown, Pa.
1947. Kay, Calvin Frederick, Univ. of Pa. Hospital (4)
1954. Kaye, Robert, Children's Hospital, 1740 Bainbridge St. (46)
1947. Keefer, George Pfahler, 136 S. 16th St. (2)
1949. Keiserman, Joseph, 5460 Baltimore Ave. (43)
1959. Keitel, Hans G., 1025 Walnut St. (7)
1932. Kelly, Herbert T., 1900 Spruce St. (3)
1961. Kelly, William E., 111 N. 49th St. (39)
1941. Kennedy, Patrick J., 32 Hampden Rd., Upper Darby, Pa.
1948. Kern, Franklin Moore, 903 Nicholson Rd., Wynnewood, Pa.
1921. Kern, Richard A., Temple University Hospital, 3401 N. Broad St. (40)
1935. Keyes, Baldwin L., 2031 Locust St. (3)
1960. Kimmich, John M., Campbell Company, Camden, N. J.
1936. King, Orville C., 330 S. 9th St. (7)
1958. Kirby, Charles K., 3400 Spruce St. (4)
1952. Kirshner, Jacob J., 1930 Chestnut St. (3)
1960. Kitchell, J. Roderick, 3719 Chestnut St. (4)
1920. Klein, Thomas, 250 S. 18th St. (3)
1952. Kleinbart, Morris, 1922 Pine St. (3)
1954. Kligman, Albert M., 36th & Spruce Sts. (4)
1934. Kline, Oram R., 514 Cooper St., Camden, N. J.
1959. Kline, Oram R., Jr., 524 Cooper St., Camden, N. J.
1948. Klingensmith, Paul O., Med. Science Bldg., Lankenau Hosp. (51)
1958. Klingensmith, Walter C., 3600 Spruce St. (4)
1956. Klinghoffer, June F., Woman's Medical College (29)
1932. Klopp, John W., Gwynedd Valley, Pa.
1960. Knopf, Carl L., 5312 Spruce St. (39)
1960. Knorr, John K., 3rd., Lankenau Medical Bldg. (51)
1959. Knowles, Harry J., 255 S. 17th St. (3)
1945. Kobler, H. B., 658 N. 63rd St. (31)
1959. Koiwai, Eichi Karl, 235 N. 15th St. (2)
1957. Koltes, John A., Jefferson Hospital, 14th Annex, 10th & Sansom Sts. (7)
1936. Konzelmann, Frank Williamson, Shore Memorial Hosp., Somer's Point, N. J.
1949. Koop, C. Everett, 1740 Bainbridge St. (46)
1952. Kornblueh, Igho H., Welsh Rd., & Verree Rd. (15)
1958. Kovach, Coleman W., 2031 Locust St. (3)
1941. Krall, J. Thomas, 85 N. Lansdowne Ave., Lansdowne, Pa.
1948. Kramer, David W., 2007 Pine St. (3)
1954. Krasnoff, Sidney O., Tabor Medical Bldg., York & Tabor Roads (41)
1944. Krauss, Frederick Harold, 136 S. 16th St. (2)
1952. Kravitz, Charles H., 626 Ashbourne Rd., Elkins Park, Pa.
1949. Kressler, Robert J., 330 S. 9th St. (7)
1941. Krewson, William E., 3rd, 1930 Chestnut St. (3)
1914. Krumbhaar, Edward B., P. O. Box 4056 (18)
1947. Kuhlenbeck, Hartwig, Woman's Medical College, 3300 Henry Ave. (29)
1947. La Boccetta, Alfred Charles, Philadelphia General Hospital, 34th St. & Curie Ave. (4)

1952. Lachman, John W., 3401 N. Broad St. (40)
1949. La Clair, Charles H., Jr., 1021 W. Main St., Norristown, Pa.
1951. Lame, Edwin L., 51 N. 39th St. (4)
1950. Lamont, Austin, 3400 Spruce St. (4)
1946. Lampe, William T. 4207 Tyson Ave. (35)
1962. Landis, Harry P., Jr., 901 Columbia Ave., Palmyra, N. J.
1963. Lang, Leonard P., 1009 Park Place, Wilmington, Del.
1952. Lang, Warren R., 1012 Walnut St. (7)
1941. Langner, Paul H., Jr., 1208 Edmonds Ave., Drexel Hill, Pa.
1945. Lansbury, John, 3401 N. Broad St. (40)
1926. Laws, George M., 1907 Spruce St. (3)
1936. Leaman, William G., Jr., Presidential Apts: Adams House B-909 (31)
1950. Learner, Norman, 3701 N. Broad St. (40)
1920. Leavitt, Frederic Headley, 1527 Pine St. (2)
1941. Leberman, Paul R., 136 S. 16th St. (2)
1957. Lee, Charles Trumbull, Jr., 33 E. Chestnut Hill Ave. (18)
1952. Lehman, J. Stauffer, 230 N. Broad St. (2)
1961. Leibfried, Jane M., 5501 Green St. (44)
1960. Leiter, Samuel S., 1301 Westbury Drive, Overbrook Park (31)
1951. Leivy, Frank E., 255 S. 17th St. (3)
1944. Lell, William A., 333 S. 18th St. (3)
1935. Lemmon, William T., 1500 Vine St. (2)
1943. Leopold, Irving H., 1711 Rittenhouse Sq. (3)
1955. Leopold, Robert L., 269 S. 19th St. (3)
1944. Lettiere, Anthony J., 425 E. State St., Trenton, N. J.
1933. Levering, J. Walter, Abington Memorial Hospital, Abington, Pa.
1959. Levick, Leonard J., 1300 E. Cliveden St. (19)
1958. Levine, Samuel, 7100 N. 19th St. (38)
1958. LeWinn, Edward B., Wyncote, Pa.
1960. Lewis, David H., Philadelphia General Hosp. (4)
1915. Lewis, Fielding O., Providence Road, Media, Pa.
1960. Lewis, George C., Jr., 133 S. 36th St. (4)
1955. Lieberman, George E., 2019 Pine St. (3)
1956. Likoff, William, 249 N. Broad St. (2)
1962. Lilley, George W., 316 W. 9th St., Chester, Pa.
1940. Limberger, William A., 301 S. Church St., West Chester, Pa.
1958. Lin, David Y. P., 2222 S. Broad St. (45)
1938. Lindauer, M. August, 133 S. 36th St. (4)
1956. Lindquist, John N., 422 Sabine Ave., Wynnewood, Pa.
1927. Lindsey, Walter H., 102 Park Drive, Highland Park, Doylestown, Pa.
1936. Lintgen, Charles, 1930 Chestnut St. (3)
1958. Lipschutz, Arthur, 7974 Fayette St. (19)
1959. Lipschutz, Herbert, 255 S. 17th St. (3)
1953. Lipsius, Edward I., 319 S. 16th St. (3)
1945. Lisker, Samuel, 419 South 19th St. (46)
1959. Little, Ralph B., 111 N. 49th St. (39)
1944. Livezey, Mary M., 133 S. 36th St. (4)
1936. Llewellyn, Thomas H., 910 N. 63rd St. (31)
1907. Lodholz, Edward, The Fairfax, 43rd & Locust Sts. (4)
1951. Long, Joseph P., 1930 Chestnut St. (3)
1935. Long, William L., 2038 Locust St. (3)
1931. Longaker, Edwin P., 41 E. Montgomery Ave., Ardmore, Pa.

1951. Lorber, Stanley H., 3701 N. Broad St. (40)
1961. Lorry, Ralph W., 1247 E. Luzerne St. (24)
1960. Lovett, B. Frank, 300 Broadway, Camden, N. J.
1936. Lucchesi, Pascal Francis, 601 E. Gorgas Lane (19)
1960. Lucine, Albert A., 345 S. 19th St. (3)
1932. Lukens, Francis D. W., Univ. of Pa. Hospital (4)
1939. Luongo, Romeo A., 2054 Locust St. (3)
1947. Lurie, Max B., Henry Phipps Institute, Univ. of Pa. (4)
1951. Luscombe, Herbert A., 136 S. 16th St. (2)
1952. Lutman, Frank C., 100 W. Coulter St. (44)
1950. Lynch, J. Edward, 23 E. Wynnewood Rd., Wynnewood, Pa.
1953. Lyons, John W., 255 S. 17th St. (3)
1952. McCabe, Edward S., 136 S. 16th St. (2)
1932. McCahey, James F., Rittenhouse-Claridge, 18th & Walnut Sts. (3)
1958. McClenahan, John L., 39 E. Chestnut Hill Ave. (18)
1935. McClenahan, William U., 33 East Chestnut Hill Ave., Chestnut Hill (18)
1953. McCloskey, Joseph F., Jefferson Hospital. (7)
1955. McClure, Carroll R., 17 S. Church St., W. Chester, Pa.
1957. McConnell, Edward L., Jr., 2342 S. Broad St. (45)
1934. McCouch, Grayson P., Univ. of Pa. School of Medicine (4)
1962. McCracken, Stewart, 3701 N. Broad St. (40)
1938. McCrea, Lowrain E., 1930 Chestnut St. (3)
1958. McCune, Wallace G., 5555 Wissahickon Ave. (44)
1942. McDonald, P. Robb, Lankenau Medical Bldg. (51)
1953. McDonnell, William V., West Jersey Hospital, Camden 4, N. J.
1952. McElroy, Robert C., 133 S. 36th St. (4)
1950. McFadden, William M., 1187 E. Washington Lane (38)
1949. McGavic, John S., 601 Montgomery Ave., Bryn Mawr, Pa.
1945. McGee, Lemuel Clyde, Hercules Powder Company, Wilmington, Del.
1954. McGehee, Edward H., 33 E. Chestnut Hill Ave. (18)
1952. McGlade, Thomas H., 719 Cooper St., Camden, N. J. M
1956. McGrath, Raymond J., 1720 Spruce St. (3)
1962. McGregor, Robert A., 255 S. 17th St. (3)
1959. McKeown, John J., Jr., 1012 Walnut St. (7)
1933. McLaughlin, James S., 330 S. 9th St. (7)
1924. McMillan, Thomas M., 1901 Walnut St. (3)
1924. McPhedran, F. Maurice, Germantown Hosp., Penn and Chew Sts. (44)
1955. McStravog, Lawrence J., 6910 Market St., Upper Darby, Pa.
1954. MacFadyen, Bruce V., 135 S. 18th St. (3)
1943. MacFarlan, Douglas, 1805 Chestnut St. (3)
1932. Macfarlane, Catherine, 136 S. 16th St. (2)
1949. MacNeal, Perry Scott, 330 S. 9th St. (7)
1951. Mac Neish, W. J., 136 S. 16th St. (2)
1955. Macy, Dorothy, Jr., 705 Beechwood Road, Media, Pa.
1957. Madow, Leo, 111 N. 49th St. (39)
1935. Maeder, LeRoy M. A., 1910 Rittenhouse Sq. (3)
1952. Mahoney, J. Francis, 250 S. 18th St. (3)
1959. Mandel, Martin M., 255 S. 17th St. (3)
1942. Manges, Lewis C., Jr., 255 South 17th St. (3)
1954. Manges, Willis E., Methodist Hospital, Broad & Wolf Sts. (48)
1959. Maniglia, Rosario, 230 N. Broad St. (2)
1949. Manlove, Francis R., 500 Williamson Rd., Gladwynne, Pa.

1936. Mann, Bernard, 2019 Pine St. (3)
1960. Manning, Valentine R., 3336 Aldine St. (36)
1956. Manstein, George, 1351 Tabor Rd. (41)
1961. Mapow, Abraham B., 535 Pine St. (6)
1953. Marbach, A. Herbert, 1307 Tabor Rd. (41)
1948. Marden, Philip Ayer, University Hospital, 36th & Spruce Sts. (4)
1937. Margolies, Alexander, 2507 Chestnut St., Chester, Pa.
1958. Marino, Daniel J., 422 East 22nd St., Chester, Pa.
1950. Mark, George E., Jr., 3401 N. Broad St. (40)
1950. Marshall, E. Wayne, Jr., 1520 Spruce St. (2)
1951. Martin, William L., Hahnemann Hospital (2)
1952. Martucci, Albert A., 5015 Akron St. (24)
1953. Marx, Halvey E., 76 Brennan Drive, Bryn Mawr, Pa.
1953. Massey, Franklin C., 122 Hillside Road, Deepdale, Strafford, Pa.
1939. May, Hans, 255 S. 17th St. (3)
1951. Mayock, Robert L., 3600 Spruce St. (4)
1958. Mays, Ralph Whiteman, 154 W. Tulpehocken St. (44)
1961. Mechanick, Philip, Ford Rd. & Monument Ave. (31)
1952. Mecray, Paul, Jr., 405 Loucroft Ave., Haddonfield, N. J.
1951. Medinger, Frederick G., 1941 Woodland Road, Abington, Pa.
1959. Medoff, Joseph, 5400 Wynnefield Ave. (31)
1955. Melnick, Theodore, 1152 N. 63rd St. (31)
1941. Mendell, Theodore H., 2023 Spruce St. (3)
1951. Mendelssohn, Edwin, 1301 Tabor Rd. (41)
1943. Meranze, David R., 1031 Lakeside Ave. (26)
1954. Mertens-Roesler, Elizabeth, 224 W. School House Lane (44)
1956. Merves, Louis, 1015 Chestnut St. (7)
1955. Mervine, Thomas B., 133 S. 36th St. (4)
1959. Metzger, Harry N., 1815 Pine St. (3)
1955. Meyer, Eugene A., 1438 Mt. Ephraim Ave., Camden, N. J.
1937. Meyer, George Phillip, 410 Haddon Ave., Camden, N. J.
1956. Miller, Bernard Joseph, 6013 Greene St. (44)
1935. Miller, Ford A., 4016 Chestnut St. (4)
1939. Miller, Malcolm W., Lankenau Medical Bldg. (51)
1939. Miller, Merle M., 6013 Greene St. (44)
1932. Miller, M. Valentine, 114 W. Phil-Ellena St. (19)
1921. Miller, T. Grier, 133 S. 36th St. (4)
1955. Miller, William H., Fitzgerald Mercy Hospital, Darby, Pa.
1952. Minehart, John R., 4821 Germantown Ave. (44)
1952. Mintz, S. S., 1930 Chestnut St. (3)
1937. Missett, Joseph Vincent, Jr., 2031 Locust St. (3)
1950. Mitchell, John McK., Bryn Mawr Hospital, Bryn Mawr, Pa.
1952. Mitchell, Robert McNair, 807 Spruce St. (7)
1959. Mitterling, Robert C., Chestnut St. & Glendale Rd., Upper Darby, Pa.
1932. Mohler, Roy W., 1806 Spruce St. (3)
1936. Montgomery, Hugh, 119 Glenn Road, Ardmore, Pa.
1936. Montgomery, John B., 1930 Chestnut St. (3)
1932. Montgomery, Thaddeus L., 2031 Locust St. (3)
1935. Moore, John Royal, 3401 N. Broad St. (40)
1947. Moore, Matthew Thibaud, 1813 Delancey Pl. (3)
1958. Moore, Samuel R., Jr., 1600 Arch St. (1)
1958. Morani, Alma D., 3665 Midvale Ave. (29)

1936. Morgan, David R., 218 W. Mt. Carmel Ave., Glenside, Pa.
1944. Morris, Harold H., Villa Nova, Pa.
1945. Morris, I. Paul, 1939 Cheltenham Ave. (17)
1957. Moyer, David G., 701 W. Main St., Lansdale, Pa.
1959. Moyer, John H., 230 N. Broad St. (2)
1941. Mucklé, Craig Wright, 6 Craig Lane, Haverford, Pa.
1929. Mudd, Stuart, Department of Bacteriology, Univ. of Pa. School of Medicine (4)
1960. Mulberger, Robert D., 1930 Chestnut St. (3)
1949. Mulholland, Stanford W., Parkway House, 22nd & Parkway (30)
1934. Mullen, Edward A., 472 Roxborough Ave. (28)
1930. Murphy, Douglas P., 601 S. Bowman Ave., Merion Station, Pa.
1953. Murphy, Edward J., Bryn Mawr Medical Bldg., Bryn Mawr, Pa.
1958. Murphy, John J., 3600 Spruce St. (4)
1959. Murray, Edwin N., 130 N. Broadway, Camden, N. J.
1955. Murtagh, Frederick, Jr.,3401 N. Broad St. (40)
1951. Myers, David, 3701 N. Broad St. (40)
1955. Nachod, Grace R., 5501 Greene St. (44)
1945. Naide, Meyer, 2034 Spruce St. (3)
1951. Naidoff, David, 3500 Tudor St. (36)
1950. Nardone, Anthony A., 912 S. 49th St. (43)
1959. Neal, Hunter, S., 406 Lankenau Medical Bldg. (51)
1958. Nealon, Thomas F., Jr., 1025 Walnut St. (7)
1948. Neese, Paul H., 17 Derwen Road, Cynwyd, Pa.
1963. Nelson, Arthur D., 3400 N. Broad St. (40)
1936. Nelson, Guy M., 255 S. 17th St. (3)
1943. Nelson, Waldo E., 615 Moreno Rd., Narberth, Pa.
1955. Nemir, Paul, Jr., 419 S. 19th St. (46)
1935. Nicholson, Jesse Thompson, 1740 Bainbridge St. (46)
1960. Nicholson, John W., III, 115 Chestnut St., Moorestown, N. J.
1947. Noone, Ernest L., 4501 Cedar Lane, Drexel Hill, Pa.
1954. Norris, Charles M., 3401 N. Broad St. (40)
1905. Norris, George W., 250 S. 18th St. (3)
1938. Norris, Robert F., 513 Wynnewood Ave., Wynnewood, Pa.
1957. Oakey, Richard S., Jr., 309 Medical Bldg., Lankenau Hospital (51)
1947. O'Keefe, John J., 255 South 17th St. (3)
1954. Olsen, Axel K., 230 N. Broad St. (2)
1949. O'Neill, James F., 140 Roslyn Ave., Glenside, Pa.
1954. O'Neill, Thomas, J. E., Centennial Bldg., Front St. & Lehigh Ave. (25)
1947. Ornsteen, A. M., 2007 Delancey Pl. (3)
1936. Orr, Theodore E., 3815 Chestnut St. (4)
1958. O'Sullivan, Ward D., Misericordia Hospital (43)
1955. Ottenberg, Donald J., 3519 N. Broad St. (40)
1913. Outerbridge, George W., 1927 Spruce St. (3)
1961. Owen, Barbara J., Bryn Mawr Hospital, Bryn Mawr, Pa.
1949. Padis, Nicholas, Lankenau Medical Bldg. (51)
1954. Palmer, Louis H., Bryn Mawr Medical Bldg., Bryn Mawr, Pa.
1909. Parish, Benjamin Dores, 704 Bethlehem Pike, Flourtown, Pa.
1963. Parish, Benjamin D., Jr., 1201 Bethlehem Pike, Flourtown, Pa.
1945. Park, Felix Roman, 1980 Utica Sq., Tulsa, Okla.
1940. Parker, Alan P., Bryn Mawr Medical Bldg., Bryn Mawr, Pa.
1948. Parkhurst, Leonard Woods, 330 S. 9th St. (7)
1952. Paxson, Newlin F., 245 N. Broad St. (7)

1932. Payne, Franklin L., Univ. of Pa. Hospital (4)
1954. Pearce, Alexander E., 1420 Race St. (2)
1958. Pearce, Rowan C., Jr., 514 Cooper St., Camden, N. J.
1943. Pearson, Gerald H. J., Presidential Apts.—Adams House (31)
1954. Pearson, Manuel M., 111 N. 49th St. (39)
1952. Peck, Roy I., 3400 Spruce St. (4)
1960. Peltz, William L., 111 N. 49th St. (39)
1930. Pendergrass, Eugene P., Univ. of Pa. Hospital (4)
1953. Penneys, Raymond, University of Pennsylvania Hospital (4)
1942. Perkins, William Harvey, The Lenox, 13th & Spruce Sts. (7)
1946. Perloff, William Harry, Albert Einstein Medical Center (41)
1953. Persky, Abram H., 1737 Chestnut St. (3)
1940. Pessel, Johannes F., 224 West State St., Trenton, N. J.
1952. Peters, Michael, Fairhill Rd., Hatfield, Pa.
1961. Peterson, Lysle H., University of Pennsylvania (4)
1940. Pettit, Horace, Times Medical Bldg., Ardmore, Pa.
1949. Pettit, Mary DeWitt, 3343 W. Penn St. (29)
1915. Pfeiffer, Damon B., Meadowbrook, Pa.
1946. Pfeiffer, Mildred C. J., 358 Valley Rd., Merion, Pa
1935. Phillips, Arthur W., 3904 Walnut St. (4)
1961. Phillips, William A., Eastern Pennsylvania Psychiatric Institute (29)
1911. Piersol, George Morris, 308 Kent Rd., Wynnewood, Pa.
1948. Pierson, Daniel B., Jr., 740 Beacon Lane, Merion, Pa.
1961. Pike, Anne H., 5603 Greene St. (44)
1957. Pilling, George Platt, IV, 2600 N. Lawrence St. (33)
1933. Pillsbury, Donald M., Univ. of Pa. Hospital (4)
1957. Platt, Ruth M., 441 Lyceum Ave. (28)
1951. Poinsard, Paul J., 2031 Locust St. (3)
1937. Polk, David Stewart, Rosemont, Pa.
1956. Pontarelli, Domenic J., 1037 Great Springs Rd., Rosemont, Pa.
1953. Porreca, George A., 1912 Spruce St. (3)
1932. Porter, Roland De Lance, Abington Medical Bldg., Abington, Pa.
1951. Post, Joseph W., 1930 Chestnut St. (3)
1951. Pote, Harry H., 103 E. Ridley Ave., Ridley Park, Pa.
1958. Potter, H. Phelps, Jr., Woman's Medical College (29)
1951. Pressman, Robert S., 170 W. Olney Ave. (20)
1947. Prickett, John A., Warrington, Bucks County, Pa.
1954. Prince, Leon N., 2025 Spruce St. (3)
1931. Pryor, Charles Allen, 255 S. 17th St. (3)
1952. Pugh, James E., 614 Church Lane, Yeadon, Pa.
1947. Putney, Floyd Johnson, 1712 Locust St. (3)
1958. Rachlin, Lillian, Veterans' Adm. Hosp., Livermore, California
1943. Radbill, Samuel X, 7043 Elmwood Ave. (42)
1953. Radbill, Sidney G., 37 S. 20th St. (3)
1953. Raffensperger, Edward C., 260 St. James Place (6)
1945. Rakoff, Abraham Edward, 269 S. 19th St. (3)
1953. Ralston, Edgar L., 3400 Spruce St. (4)
1931. Ramsey, Frank M., 620 E. Willow Grove Ave. (18)
1953. Ranieri, Tito A., 2320 S. Broad St. (45)
1941. Rankin, Charles A., Ludlow & Heather Rd., Upper Darby, Pa.
1946. Rapaport, Milton, Children's Hospital, 1740 Bainbridge St. (46)
1951. Rathmell, Thomas K., 446 Bellevue Ave., Trenton, N. J.

1926. Ravdin, I. S., Univ. of Pa. Hospital (4)
1956. Ravdin, Robert Glenn, 3400 Spruce St. (4)
1959. Raventos, Antolin, 3400 Spruce St. (4)
1962. Raymond, F. Douglas, Jr., Bryn Mawr Medical Bldg., Bryn Mawr, Pa.
1961. Read, William T., Jr., Cooper Hospital, Camden, N. J.
1954. Reagan, Lindley B., 175 Madison Ave., Mt. Holly, N. J.
1960. Reed, Theodore P., Lankenau Medical Bldg. (51)
1928. Reese, Warren S., 2118 Locust St. (3)
1920. Rehfuss, Martin E., 131 St. George's Rd., Ardmore, Pa.
1921. Reiff, E. Paul, 1927 Spruce St. (3)
1919. Reimann, Stanley P., 703 W. Phil-Ellena St. (19)
1956. Reishtein, William A., 255 S. 17th St. (3)
1963. Reisinger, Paul B., 855 Berkeley Ave., Trenton, N. J.
1951. Rentschler, Laurence B., 5800 Ridge Ave. (28)
1945. Rhoads, Jonathan E., Univ. of Pa. Hospital (4)
1951. Richardson, Fred Mac D., 160 Carpenter Lane (19)
1919. Richardson, Russell, Phila. Tuberculosis Sanitorium #4, Corinthian & Girard Aves. (30)
1951. Riegel, Donald, 5110 Chester Ave. (43)
1942. Riggs, Helena E., 150 Hewitt Rd., Wyncote, Pa.
1936. Ritter, Joseph A., 2405 N. 54th St. (31)
1932. Robbins, Frederick R., 317 Milbank Rd., Bryn Mawr, Pa.
1952. Robbins, Robert, 3401 N. Broad St. (40)
1960. Robbins, William S., 255 S. 17th St. (3)
1954. Roberts, Brooke, 3400 Spruce St. (4)
1939. Roberts, Ella, 46 Linden Ave., Lansdowne, Pa.
1957. Roberts, Joan Mary, 4 W. Mt. Pleasant Ave. (19)
1932. Robertson, Harold F., 2118 Pine St. (3)
1938. Roche, Philip Q., Route 1, Conshohocken, Pa.
1961. Rodahl, Kaare, Lankenau Hospital Research (51)
1960. Roeders, Paul H., 330 S. 9th St. (7)
1955. Rogers, Fred B., 3401 N. Broad St. (40)
1951. Ronis, Bernard J., 2106 Spruce St. (3)
1948. Roscoe, Constantine R., 7226 Castor Ave. (24)
1928. Rose, Edward, 426 Owen Rd., Wynnewood, Pa.
1936. Rose, Elizabeth Kirk, 426 Owen Rd., Wynnewood, Pa.
1959. Rose, Isadore, 6000 W. Oxford St. (31)
1952. Rose, S. Brandt, Chestnut Hill Hospital (18)
1946. Rosemond, George Parrott, 3401 N. Broad St. (40)
1960. Rosenow, Edward C., Jr., American College of Physicians, 4200 Pine St. (4)
1948. Rothman, Maurice M., 1727 Spruce St. (3)
1951. Rouse, George P., Jr., 250 South 18 St. (2)
1952. Roxby, Bruce S., 5501 Greene St. (44)
1955. Roxby, John B., Jr., 4821 Germantown Ave. (44)
1949. Royster, Henry P., 3400 Spruce St. (4)
1941. Royster, Hubert A., Jr., 888 Glenbrook Ave., Bryn Mawr, Pa.
1959. Rubin, Alan, 255 S. 17th St. (3)
1952. Rubin, I. Edward, 255 S. 17th St. (3)
1933. Rudolphy, Jay Besson, 230 S. 21st St. (3)
1946. Rupp, Charles, 133 S. 36th St. (4)
1947. Rush, Alexander, 330 S. 9th St. (7)
1960. Russell, George W., 430 Greenwood Ave., Wyncote, Pa.
1945. Rynes, Samuel E., 334 S. 21st St. (3)

1952. Sain, Fletcher D., 8 Orchard Ave., Bristol, Pa.
1958. Sall, Manuel, 255 S. 17th St. (3)
1952. Salner, Nathan P., 6812 Castor Ave. (24)
1952. Saltzman, Maurice, 2037 Spruce St. (3)
1944. Sampson, David Alan, 726 Braeburn Lane, Penn Valley, Narberth, Pa.
1936. Sands, Joseph Evans, Tedyn Apts., Bryn Mawr, Pa.
1950. Sarner, Joseph B., 269 S. 19th St. (3)
1949. Saul, Leon J., Highland Ave., Media, Pa.
1908. Sautter, Albert C., 6733 Emlen St. (19)
1954. Savacool, J. Woodrow, 146 W. Tulpehocken St. (44)
1947. Sayen, John J., 3600 Spruce St. (4)
1948. Scarano, Joseph Albert, 1432 S. Broad St. (46)
1917. Schaeffer, J. Parsons, 4634 Spruce St. (39)
1929. Scheffey, Lewis C., 601 Walnut Lane, Haverford, Pa.
1942. Scheie, Harold G., 3400 Spruce St. (4)
1929. Schenck, Harry P., 1235 Wyngate Rd., Wynnewood, Pa.
1945. Schlezinger, Nathan S., 255 S. 17th St. (3)
1961. Schlosser, Woodrow D., 3701 N. Broad St. (40)
1917. Schnabel, Truman G., 1704 Pine St. (3)
1958. Schnabel, Truman G., Jr., Phila. General Hospital (4)
1957. Schnall, Nathan, 2037 Pine St. (3)
1962. Schneider, Henry C., 4801 Penn St. (24)
1928. Schofield, Frederick S., 1509 E. Barringer St. (50)
1955. Schreader, Charles J., 318 W. Godfrey Ave. (20)
1958. Schreck, Kenneth M., Temple University School of Medicine (40)
1952. Schulz, Norbert J., 1901 Walnut St. (3)
1963. Schumacher, L. Richard, Abington Memorial Hospital, Abington, Pa.
1950. Schumann, Francis, 8811 Germantown Ave. (18)
1948. Schwarz, Gabriel A., 133 S. 36th St. (4)
1962. Schwarz, Henry P., Philadelphia General Hospital (4)
1955. Schwegman, Cletus W., Hospital of the University of Penna. (4)
1930. Scott, John Porter, Children's Hospital, 1740 Bainbridge St. (46)
1950. Scott, Michael, 3401 N. Broad St. (40)
1940. Scott, T. F. McNair, Children's Hospital, 1740 Bainbridge St. (46)
1952. Seifer, Arthur F., 710 South Main St., Phoenixville, Pa.
1954. Seifter, Joseph, Wyeth Institute for Medical Research (1)
1958. Sellers, Alfred M., Hosp. of the Univ. of Pa. (4)
1952. Semisch, Charles W., III, 5329 Rising Sun Ave. (20)
1961. Sencindiver, Paige V., 2228 S. Broad St. (45)
1958. Shafer, Albert H., 1004 E. Cherry Hill Apts., Merchantsville 10, N. J.
1960. Shannon, Gerard M., 1434 E. Hunting Park Ave. (24)
1950. Sharp, Reuben L., 719 Cooper St., Camden, N. J.
1928. Sharpless, Frederick C., 621 Railroad Ave., Haverford, Pa.
1956. Shaw, Daniel L., Jr., 702 Knox Rd., Villanova, Pa.
1948. Shay, Harry, 3400 N. Broad St. (40)
1955. Shechter, Fred R., 2461 No. 54th St. (31)
1954. Shelley, Walter B., 36th & Spruce Sts. (4)
1955. Shenkin, Henry A., Episcopal Hospital (25)
1946. Shepherd, Samuel Garfield, 2039 Pine St (3)
1932. Sheridan, Joyce T., 412 W. Durham St. (19)
1956. Sherson, Jacob S., 131 Channing Ave., Malvern, Pa.
1936. Shipman, James Shelby, 514 Cooper St., Camden, N. J.

1958. Shipps, Hammell P., 719 Cooper St., Camden 2, N. J.
1957. Shope, Edward Pierce Lentz, 807 Wilson Bldg., Camden, N. J.
1946. Shoup, George Daniel, 121 W. Walnut Lane (44)
1955. Shubin, Harry, 6601 N. 21st St. (38)
1952. Shuman, Charles R., 3401 N. Broad St. (40)
1949. Sidlick, David M., 255 S. 17th St. (3)
1941. Silcox, Louis E., Lankenau Medical Bldg. (51)
1956. Sillars, Charles H., Abington Memorial Hospital, Abington, Pa.
1955. Silverstein, Alexander, 2114 Pine St. (3)
1961. Simmons, Vaughan P., The Fidelity Mutual Life Insurance Co. (1)
1954. Singmaster, Lawrence, Lankenau Medical Bldg. (51)
1952. Skromak, Stanley J., 5108 Torresdale Ave. (35)
1958. Sloviter, Henry A., 3400 Spruce St. (4)
1929. Smith, Austin T., 330 S. 9th St. (7)
1955. Smith, J. Winslow, 3034 Darby Rd., Ardmore, Pa.
1933. Smith, Lauren Howe, 111 N. 49th St. (39)
1952. Smith, Richard T., 330 S. 9th St. (7)
1927. Smyth, Calvin Mason, Abington Memorial Hospital, Abington, Pa.
1951. Snape, William J., 573 Stevens St., Camden, N. J.
1938. Snodgrass, L. E., Barclay Hotel, 18th & Rittenhouse Sq. (3)
1953. Snyder, G. Gordon, Bryn Mawr Medical Bldg., Bryn Mawr, Pa.
1958. Sodeman, William A., 1025 Walnut St. (7)
1961. Soffe, Alvin M., 1930 Chestnut St. (3)
1935. Sokoloff, Martin J., 255 S. 17th St. (3)
1951. Solis-Cohen, Leon, 1530 Locust St. (2)
1940. Soloff, Louis A., 3401 N. Broad St. (40)
1950. Somerville, William J., 37 S. 20th St. (3)
1944. Sommer, George N. J., Jr., 120 W. State St., Trenton, N. J.
1952. Sones, Maurice, Mt. Airy Medical Bldg. (19)
1951. Sonneborn, Duane G., 1200 W. Erie Ave. (24)
1928. Spaeth, Edmund B., 1930 Chestnut St. (3)
1958. Spaeth, Philip G., 1930 Chestnut St. (3)
1937. Spangler, John Luther, Devon, Pa.
1957. Spelman, Joseph Worcester, Dept. of Public Health, 13th & Wood Sts. (7)
1935. Spiegel, Ernest A., 6807 Lawnton Ave. (26)
1961. Spiegelman, Jay, Benson East Apt., Jenkintown, Pa.
1955. Spitz, Eugene B., Children's Hospital (46)
1958. Splendido, Joseph A., 608 W. Clivedon (19)
1961. Stahlgren, LeRoy H., 419 South 19th St. (46)
1960. Stainback, William C., Bryn Mawr Medical Bldg., Bryn Mawr, Pa.
1957. Stanley, Robert C. G., 2315 Edgemont Rd., Chester, Pa.
1927. Starr, Isaac, 505 Cresheim Valley Rd. (18)
1952. Stauffer, Herbert M., 3401 N. Broad St. (40)
1952. Stayman, Joseph W., Jr., 8815 Germantown Ave. (18)
1945. Stecher, H. Armin, 1510 Darby Rd., Havertown, Pa.
1955. Steel, Howard H., 3401 N. Broad St. (40)
1952. Steiger, William A., 3401 N. Broad St. (40)
1946. Stein, Irvin, 1936 Spruce St. (3)
1953. Stein, Raymond O., 269 S. 19th St. (3)
1936. Steinfield, Edward, 2200 Benjamin Franklin Parkway (30)
1951. Sterling, Julian A., 1008 Sharpless Rd. (26)
1948. Stevens, Lloyd W., 133 S. 36th St. (4)

1928. Stokes, Joseph, Jr., Children's Hospital, 1740 Bainbridge St. (46)
1943. Stokes, S. Emlen, 129 Chester Ave., Moorestown, N. J.
1954. Stone, Hrant H., E. Shawmont Ave. (28)
1952. Stoner, Emery K., 222 E. Mt. Pleasant Ave. (19)
1961. Strang, John E., 330 S. 9th St. (7)
1953. Strawbridge, Rendall R., Lankenau Medical Bldg. (51)
1937. Strumia, Max M., Penn Valley, Narberth, Pa.
1960. Strumia, Paul V., Bryn Mawr Hospital, Bryn Mawr, Pa.
1927. Sturgis, Samuel Booth, 349 Wistar Rd., Wynnewood, Pa.
1961. Sullivan, Andrew A., 5455 Trinity Place (43)
1961. Sullivan, Benjamin H., Jr., 1830 Rittenhouse Square (3)
1930. Sunderman, F. William, 1833 Delancey Place (3)
1961. Sunderman, F. William, Jr., 1025 Walnut St. (7)
1954. Sussman, Marcel S., 101 S. 20th St. (3)
1952. Sweeney, Francis X., 2412 E. Allegheny Ave. (34)
1955. Taggart, Harold A., 235 N. 15th St. (2)
1952. Talbot, Timothy R., Jr., 204 Booth Lane, Haverford, Pa.
1943. Tassman, Isaac S., 136 S. 16th St. (2)
1946. Tauber, Robert, 2019 Walnut St. (3)
1952. Taylor, Ann Gray, 6364 Germantown Ave. (44)
1960. Taylor, Daniel B., 2241 Federal St. (46)
1956. Templeton, John Y., III, 1025 Walnut St. (7)
1951. Theodos, Peter A., 1930 Chestnut St. (3)
1961. Therman, Per-Olof, 111 N. 49th St. (39)
1959. Thomas, Arthur H., 5240 Vine St. (39)
1946. Thomas, Carmen C., 1930 Chestnut St. (3)
1952. Thompson, Charles M., 255 S. 17th St. (3)
1961. Thompson, James C., 803 Spruce St. (7)
1927. Thorington, J. Monroe, 37 S. 20th St. (3)
1936. Thorp, Francis Quicksall, 4900 Penn St. (24)
1936. Thudium, William J., 700 Merion Square Rd., Gladwyne, Pa.
1954. Tindall, Dorothy D., 1930 Rittenhouse Sq. (3)
1935. Tocantins, Leandro Maués, 1025 Walnut St. (7)
1935. Toland, Owen J., Episcopal Hospital, Front and Lehigh Aves. (25)
1952. Tondreau, Roderick L., 6470 Drexel Rd. (31)
1949. Tornay, Anthony S., 2038 Locust St. (3)
1945. Tourish, William J., 1124 Woodmont Rd., Gladwyne, Pa.
1936. Towson, Charles Emory, 224 W. Washington Lane (44)
1955. Trimpi, Howard D., 501 N. 17th St., Allentown, Pa.
1954. Trommfr, Philip R., 258 S. 18th St. (3)
1956. Troncelliti, Mario V., Pennsylvania Hospital (7)
1953. Tropea, Frank, Jr., 500 Mulberry Lane, Haverford, Pa.
1947. Trueman, Robert H., 2101 Chestnut St. (3)
1954. Truitt, R. Marshall, Jr., 740 Westview St. (19)
1959. Tuddenham, William J., Pennsylvania Hospital (7)
1938. Tuft, Louis, 1530 Locust St. (2)
1933. Tumen, Henry J., 1830 Rittenhouse Square (3)
1938. Turman, Christopher M., 1531 Amity Rd., Rydal, Pa.
1923. Turner, Creighton, H., 1731 Pine St. (3)
1954. Turner, Linton W., 3401 N. Broad St. (40)
1959. Tyson, R. Robert, 3401 N. Broad St. (40)
1937. Uhle, Charles A. W., Lankenau Medical Bldg. (51)

1953. Ulin, Alexander, W., 230 N. Broad St. (2)
1907. Ullom, Josephus T., Carpenter and Quincy Sts. (19)
1960. Uricchio, Joseph F., 245 N. Broad St. (7)
1950. Valdes-Dapena, Antonio, 3006 Midvale Ave., Phila. (29)
1958. Van den Noort, Gordon S., 888 Glenbrook Ave., Bryn Mawr, Pa.
1937. Vander Veer, Joseph B., 330 S. 9th St. (7)
1937. Van Loon, Emily Lois, 255 S. 17th St. (3)
1960. Van Meter, Ralph H., 244 W. Main St., Moorestown, N. J.
1933. Vastine, Jacob H., 2nd, 267 Kent Rd., Wynnewood, Pa.
1958. Velkoff, Cyril L., 2100 Walnut St. (3)
1955. Viek, Peter, 1941 Woodland Rd., Abington, Pa.
1952. Vischer, Thomas J., 5903 Greene St. (44)
1940. Voegelin, Adrian W., Germantown Professional Bldg. (44)
1941. Vogel, Stoughton R., 151 W. Tulpehocken St. (44)
1960. Wagenheim, Harry H., 1822 Spruce St. (3)
1949. Wagner, Frederick B., Jr., 800 Chauncy Road, Narberth, Pa.
1949. Wagner, Joseph A., 201 Highland Ave., Bryn Mawr, Pa.
1954. Wainer, Amos S., 1621 Spruce St. (2)
1938. Waldman, Joseph, 404 Meadowbrook Lane (18)
1955. Waldron, Jerome M., 2300 Cheltenham Ave. (50)
1932. Walkling, Adolph A., 136 S. 16th St. (2)
1955. Warner, Halsey F., 100 W. Coulter St. (44)
1956. Watkins, E. Lloyd, 8811 Germantown Ave. (18)
1954. Waugh, Elizabeth S., 348 Greene Lane (28)
1952. Weaver, Harry S., Jr., 37 S. 20th St. (3)
1955. Weaver, Robert L., 26 Henley Rd. (31)
1953. Weber, Lennard L., 255 S. 17th St. (3)
1930. Weeder, S. Dana, 250 W. Tulpehocken St. (44)
1954. Weiner, Louis H., Carlene Apts., 2500 Belmont Ave. (31)
1952. Weinstein, George L., 255 S. 17th St. (3)
1950. Weiss, Sidney, 2037 Locust St. (3)
1959. Wellenbach, Burton L., 255 S. 17th St. (3)
1951. Welty, Jack W., Montgomery Ave. & Owen Rd., Wynnewood, Pa.
1955. Wendkos, Martin H., Latches Lane Apts., Merion, Pa.
1962. Wentz, Clarkson, 20 S. Valley Road, Paoli, Pa.
1961. Wermuth, William C., 111 N. 49th St. (39)
1959. West, Clifton F., Jr., 406 Lankenau Medical Bldg. (51)
1959. Whayne, Tom F., 4219 Chester Ave. (4)
1935. Whelan, G. L., 2014 Delancey Place (3)
1921. Whitaker, William, 4645 Oakland St. (24)
1936. White, Ellen Pawling Corson-, Gladwyne, Pa.
1960. Whiteley, William H., 1015 Chestnut St. (7)
1925. Widmann, Bernard P., 250 S. 18th St. (3)
1954. Wieder, Henry S., Jr., 330 S. 9th St. (7)
1939. Willauer, George, 6129 Greene St. (44)
1937. Williams, John C., 6370 Germantown Ave. (44)
1920. Williams, Philip F., 256 Broughton Lane, Villanova, Pa.
1950. Williams, R. G., Univ. of Pa. School of Medicine (4)
1927. Williamson, Ernest G., 6353 Woodbine Ave. (31)
1949. Willson, J. Robert, 3401 N. Broad St. (40)
1945. Wilson, John F., 2013 Delancey Pl. (3)
1937. Wilson, Ross B., Lankenau Medical Bldg. (51)

1949. Wilson, William W., 133 S. 36th St. (4)
1957. Winkelman, N. William, Jr., 4141 Apalogen Rd. (44)
1948. Winston, Julius, 5839 Chester Ave. (43)
1941. Wirts, C. Wilmer, 2017 Delancey St. (3)
1961. Wise, Robert I., 1025 Walnut St. (7)
1953. Wohl, George T., Philadelphia General Hospital (4)
1933. Wohl, Michael G., 1727 Pine St. (3)
1958. Woldow, Irving, Einstein Med. Center, York & Tabor Rds. (41)
1958. Wolf, John H., 124 W. Walnut Lane (44)
1944. Wolf, Lewis R., 3474 Frankford Ave. (34)
1918. Wolferth, Charles C., 133 S. 36th St. (4)
1962. Wolferth, Charles C., Jr., 230 N. Broad St. (2)
1957. Wolgamot, John R., 244 W. Main St., Moorestown, N. J.
1957. Wolkowicz, Michael I., 2022 Spruce St. (3)
1942. Wolman, Irving J., 7607 Woodlawn Ave. (26)
1932. Wood, Francis C., 212 Laurel Lane, Haverford, Pa.
1944. Wood, H. Curtis, Jr., 7010 Lafayette Ave., Fort Washington, Pa.
1953. Woodruff, Marston T., 4940 Penn St. (24)
1928. Wright, Carroll S., 1402 Spruce St. (2)
1960. Wurzel, Harold A., 3400 Spruce St. (4)
1960. Yanoff, Jacob, 1000 Johnston St. (48)
1941. Young, Barton R., Germantown Hospital (44).
1961. Zanni, Anthony L., 111 N. 49th St. (39)
1957. Zaslow, Jerry, 1351 Tabor Rd. (41)
1955. Zatuchni, Jacob, 3401 N. Broad St. (40)
1946. Zeigerman, Joseph H., 2105 Spruce St. (3)
1949. Zintl, William J., 69th & Market Sts., Upper Darby, Pa.
1956. Ziserman, Abraham J., 2046 Pine St. (3)
1962. Zubrow, Sidney N., 521 Pine St. (6)
1933. Zulick, J. Donald, Abington Memorial Hospital, Abington, Pa.

Non-Resident Fellows

ELECTED

1912. Addison, William H. F., 266 East Sidney Avenue, Mt. Vernon, N. Y.
1936. Alexander, Fay K., Lincolnville, Maine
1941. *Aronson, Ronald S., 9401 Byeforde Road, Kensington, Md.
1954. Austin, George M., University of Oregon Medical School, Portland, Oregon.
1942. Bachman, Carl, Rutherford, Napa Co., Calif.
1931. Bates, William, Harrisburg Hospital, Harrisburg, Pa.
1955. Beckfield, William J., Luther Hospital, 310 Chestnut St., Eau Claire, Wisconsin.
1932. Behney, Charles A., Dept. of Health, Old DeWitt Rd., Lansing, Mich.
1955. Blank, Harvey, Jackson Memorial Hospital, Miami 36, Fla.
1921. Borzell, Francis F., R. D. 2, Box 2051, Browns Mills, N. J.
1937. Braceland, Francis J., The Institute of Living, 200 Retreat Ave., Hartford, Conn.
1959. Brady, Luther W., Peter Bent Brigham Hospital, Boston 15, Mass.
1951. Brinton, S. Jervis, Box 666, Stone Harbor, N. J.
1948. *Brown, Robert B., U. S. Naval Hospital, Bethesda, Md.
1959. Browneller, Ellsworth R., Geisinger Medical Center, Danville, Pa.
1953. Burbidge, J. Raymond, 163 Nassau St., Princeton, N. J.

* Military service.

1948. Chapman, John P., Calle Fray Junipero Serra 26, Palma de Mallorca, Balearic Islands, Spain.
1950. Chapple, Charles C., 1500 Massachusetts Ave., N.W., Washington, D. C.
1941. Cheleden, John, 1012 Volusia Ave., Daytona Beach, Fla.
1930. Clarke, Francis Mann, 116 New St., New Brunswick, N. J.
1926. Clerf, Louis H., 5575-8th Ave., North St. Petersburg, Fla.
1930. Cottrell, James E., 27 Shinnecock Trail, Medford Lakes, N. J.
1959. *Cowan, Capt. John S., U. S. Atlantic Fleet, P.O. Box 100, Norfolk 11, Va.
1960. Cowley, Allen W., Sr., 1919 N. Front St., Harrisburg, Pa.
1940. Crowe, Aldrich C., 1208 Ocean Ave., Ocean City, N. J.
1947. Cutler, Norman L., 1300 Harrison St., Wilmington, Del.
1941. *Cuttle, Tracy D., Portsmouth Naval Shipyard, Portsmouth, N. H.
1955. Daugherty, J. Arthur, 1511 N. Front St., Harrisburg, Pa.
1937. Davis, Perk Lee, Turkey Hollow, R.D. 5, Waynesburg, Pa.
1954. Deitrick, John E., Cornell Medical College, 1300 York Ave., New York 21, N. Y.
1941. Dixon, Harold M., 4805 46th St., N.W., Washington 16, D. C.
1953. Dixon, James P., Antioch College, Yellow Springs, Ohio.
1961. Duane, Thomas D., 35 E. Elizabeth Ave., Bethlehem, Pa.
1959. Durgin, Bernice Elise, 221 N. Allegheny St., Bellefont, Pa.
1955. Edwards, Margaret Hay, 800 4th St., S.W., Washington 24, D. C.
1953. Eisenberg, Isadore J., 2806 Green St., Harrisburg, Pa.
1951. Ellis, Mackinnon, 121 Mill Rock Rd., Hamden, Conn.
1957. *Errion, Arthur Robbins, U. S. Naval Hospital St. Albans, L. I., N. Y.
1951. Ervin, Carl E., 240 North Third Street, Harrisburg, Pa.
1944. Estes, W. L., Jr., 35 E. Elizabeth Ave., Bethlehem, Pa.
1954. Evans, Harry D., Jr., American Cyanamid Co., 1 Caspar St., Danbury, Conn.
1952. Faller, Constantine P., 127 State St., Harrisburg, Pa.
1940. Forrester, James S., Harrisburg Polyclinic Hospital, Harrisburg, Pa.
1951. Friedland, Carl K., 271 W. Blackwell St., Dover, N. J.
1947. Gaskill, Herbert S., 250 Ash St., Denver, Colo.
1913. Gates, Nathaniel, 10 Peterboro Ave., Detroit, Mich.
1958. Geckeler, George D., Tranquility, S. Windham, Vt.
1957. Giering, John Fleming, 84 James St., Kingston, Pa.
1931. Gilman, Robert Louis, Cheyney, Pa.
1954. Godfrey, Ellwood W., Princeton Hospital, Princeton, N. J.
1928. Gordon, Burgess L., 1550 Lake Shore Dr., Chicago, Illinois
1952. Grieco, Reynold M., 2 W. 4th St., Williamsport, Pa.
1934. Griffith, John Q., Jr., 6 North Fredericksburg Ave., Margate, N. J.
1952. Gross, Elmer R., Medical Arts Bldg., Wilmington, Del.
1933. Gruber, Charles M., 1313 College Ave., Redlands, Calif.
1935. Haines, Harlan F., 231 N. Pine St., Seaford, Del.
1939. Hamblock, Leonard C., R.D. 2, Mt. Joy, Pa.
1955. Harris, John H., 1301-A N. Second St., Harrisburg, Pa.
1936. Hatch, Lerleen Clement, 2184 Ayres Ave., Akron, Ohio.
1947. Hawthorne, Herbert R., 1016 Yardley Rd., Morrisville, Pa.
1928. Hayman, Joseph Marchant, Jr., Tufts College Medical School, Boston, Mass.
1946. Hendrickson, Frank O., Jupiter, Fla.
1944. Hershey, J. Ivan, VA Hospital, Shreveport, La.
1955. Hills, Arthur G., 1000 N. W. 17th St., Miami, Fla. (36)
1933. Hitzrot, Lewis H., Medical Director, Mercersburg Academy, Mercersburg, Pa.
1950. Horn, Robert C., Henry Ford Hospital, Detroit, Mich.
1953. Imber, Irving, 428 Walnut St., Reading, Pa.
1958. Impink, Robert R., 405 Oley St., Reading, Pa.

1935. Ingleby, Helen, The Church House, Heacham, King's Lynn, England.
1921. Ivy, Robert H., 104 Dalton Rd., Paoli, Pa.
1952. Jones, Ralph, Jr., Jackson Memorial Hospital, Miami, Fla.
1955. Jordan, Charlotte B., 519 Sarah St., Stroudsburg, Pa.
1955. Jordan, Claus G., 519 Sarah St., Stroudsburg, Pa.
1936. Kain, Thomas M., 30 Northeast 97th St., Miami, Fla.
1956. Keffer, William H., 413 Oley St., Reading, Pa.
1947. Kelchner, Clyde H., 1125 Turner St., Allentown, Pa.
1944. LaMotte, William O., Brook Hill Farms, Hockessin, Del.
1954. LaMotte, William O., Jr., Professional Bldg., Wilmington 3, Del.
1952. Levan, John B., 401 Oley St., Reading, Pa.
1949. Lhamon, William T., Baylor University College of Medicine, Houston, Texas
1954. Light, John J. B., 25 N. 9th St., Lebanon, Pa.
1954. Lindenmuth, Woodrow W., VA Hospital, West Haven, Conn.
1948. Livingood, Clarence S., Henry Ford Hospital, Detroit 2, Mich.
1933. Long, Esmond R., Conifer, Pedlar Mills, Va.
1919. Lynch, Frank B., Jr., U. S. Veterans Hospital, Coatesville, Pa.
1948. McCall, Milton L., Elizabeth Steel Magee Hospital, Pittsburgh, Pa. (13)
1948. McLaughlin, John T., 1252 S. Central Ave., Glendale, Calif.
1950. Mackmull, Gulden, 174 Nob Hill Lane, Ventura, California.
1953. Margolies, Michael, 567 E. Chestnut St., Coatesville, Pa.
1955. Margolies, M. Price, 379 E. Chestnut St., Coatesville, Pa.
1935. Mason, James B., 40 E. Erie St, Chicago 11, Ill.
1932. Meade, Richard H., Jr., 750 San Jose Dr., Grand Rapids, Mich.
1936. Middleton, William Shainline, Veterans Administration, Washington, D. C.
1946. Miller, Franklin R., Snyder-Jones Clinic, First Nat. Bk. Bldg., Winfield, Kansas.
1928. Moon, Virgil H., Univ. of Miami, Coral Gables, Fla.
1949. Motley, Hurley L., 1212 Shatto S., Los Angeles, Calif.
1937. Nicholson, Samuel T., 2d, 642 High St., Pottstown, Pa.
1960. Ojers, Gaylord W., 35 E. Elizabeth Ave., Bethlehem, Pa.
1956. Oppenheimer, Albert, 224 E. Main St., Moorestown, N. J.
1926. Paul, John Rodman, Dept. Preventive Medicine, Yale University, New Haven, Conn.
1959. Pendergrass, Henry P., Massachusetts General Hospital, Boston, Mass.
1950. Pincus, Irwin J., Cedars of Lebanon Hospital, Los Angeles, Calif.
1938. Read, Hilton S., 5407 Atlantic Ave., Atlantic City, N. J.
1958. Reinhardt, David J., III, 1303 Delaware Ave., Wilmington, Del.
1936. Reisinger, John A., 1835 Eye St., N.W., Washington, D. C.
1955. Rettew, Philip L., 612 Museum Rd., Reading, Pa.
1961. Richardson, Herschel E., 4633 Kingfisher St., Houston, Texas.
1947. Rogers, Arthur Merriam, 1351 Durwood Drive, Charlotte, N. C.
1907. Royer, B. Franklin, 429 E. Baltimore St., Greencastle, Pa.
1956. Rubenstone, Albert I., Michael Reese Hosp., Chicago, Ill.
1954. Sampson, Martin C., Schering Corp., Bloomfield, N. J.
1945. Schell, James F., 506 Sharpley Lane, Wilmington, Del.
1921. Schumann, Edward A., 4141 Jackson Drive, Lafayette Hill, Pa.
1951. Seitchik, Joseph, Sinai Hospital of Baltimore, Baltimore, Md.
1941. Shands, Alfred R., Jr., Alfred I. duPont Institute, Rockland Rd., Wilmington, Del.
1908. Shannon, Charles E. G., 9 Park St., Waterville, Maine.
1950. Shiffer, Paul H., Dreher Ave., R.D. #2, Stroudsburg, Pa.
1951. Shorey, Winston K., 46 Wingate Drive, Little Rock, Ark.
1933. Smelzer, Donald C., Lancaster General Hospital, Lancaster, Pa.
1954. Smith, Charles W., 128 State St., Harrisburg, Pa.

1929. Sponsler, Marshall B., 103 Lansdowne Road, DeWitt, N. Y.
1953. Steele, Brandt F., 717 Pontiac St., Denver 20, Colo.
1952. Steele, Eleanor, 717 Pontiac St., Denver 20, Colo.
1942. Stengel, Alfred, Jr., 75 Highland St., Holden, Mass.
1955. Stevenson, Theodore D., Presbyterian Board of Foreign Missions, 156 Fifth Ave., New York 10, N. Y.
1934. Stewart, Sloan G., Pacific and North Carolina Avenues, Atlantic City, N. J.
1931. Stiles, Merritt H., E. 406 14th Ave., Spokane 3, Wash.
1953. Stroud, Morris W., 3rd, Harvard Rd., Cleveland, Ohio.
1934. Summey, Thomas J., Morrowdale Farm, Rt. 2, Charlottesville, Va.
1931. Taylor, Norman H., Queen of the East, E. Broadway, Hamilton, Bermuda.
1928. Thomas, J. Earl, Loma Linda University, Loma Linda, Calif.
1942. Thompson, Wesley D., 247 E. 3rd St., Lewistown, Pa.
1941. Tompkins, Pendleton, 490 Post St., San Francisco, Calif.
1959. Toole, James F., Bowman Gray School of Medicine, Winston Salem, N. C.
1897. Veasey, Clarence A., 1118 W. 9th Ave., Spokane 9, Wash.
1933. Waygood, James L., Pocono Pines, Pa.
1941. Weaver, Ruth H., 108 Atlantic Ave., Atlantic City, N. J.
1936. Wilder, Theodore S., Beckley Memorial Hospital, Beckley, W. Va.
1935. Willard, John H., Harlan Memorial Hospital, Harlan, Kentucky.
1953. Wilson, Julius L., Natl. Tuberculosis Assn., 1790 Broadway, New York City (19).
1963. Wood, Horatio C., IV, Cincinnati General Hospital, Cincinnati, Ohio.
1953. Zarafonetis, Chris J. D., Simpson Memorial Institute, University of Michigan, Ann Arbor Michigan

Honorary Fellows

Limited to Fifty, of Whom Twenty May be Foreigners.

American

ELECTED

1959. Fay, Marion, B.A., M.A., PH.D., SC.D.(HON.), LL.D.(HON.), Woman's Medical College, Henry Ave. & Abbottsford Rd. (29)
1936. Richards, Alfred Newton, PH.D., SC.D.(HON.), M.D.(HON), LL.D.(HON), Emeritus Professor of Pharmacology, School of Medicine, and Associate Trustee, University of Pennsylvania. (4)
1958. Shryock, Richard H., PH.D., American Philosophical Society, Independence Square (6)
1947. Stone, Robert Spencer, M.D., University of California Medical School, San Francisco, Cal.

Foreign

1937. Dale, Sir Henry Hallet, C.B.E., F.R.S., M.A., M.D., F.R.C.P., 52 Queen Anne St., London, W. 1, England.
1955. Mann, Ida, M.A., D.SC., M.B., B.S., L.R.C.P., D.O.M.S., F.R.C.S., Ophthalmic Consultant to the Government of W. Australia, 56 Hobbs St., Nedlands, Perth, W. Australia.
1962. Schweitzer, Albert, PH.D., TH.D., M.D., D.D.(HON.), MUS.D.(HON.), LL.D.(HON.), O.M., Lambaréné Hospital, Lambaréné, Gabon Republic, W. Africa.

Honorary Associate Fellows

1955. Clement, Martin W., 6 Penn Center Plaza (4)
1955. Diemand, John A., President, Insurance Company of North America, 1600 Arch St. (2)

Necrological List

Resident Fellows	*Date of Election*	*Date of Death*
Bradley, William N.	October 2, 1907	April 16, 1962
Crampton, George S.	January 2, 1907	November 12, 1962
Dunne, Francis Sidney	February 7, 1951	February 13, 1963
Ely, William C.	January 8, 1934	February 20, 1962
Fritch, J. Scott	May 8, 1933	June 4, 1962
Goldburgh, Harold L.	January 9, 1933	October 6, 1962
Gopadze, Illarion I.	October 4, 1949	November 17, 1962
Klauder, Joseph V.	June 2, 1920	April 2, 1962
Kolmer, John A.	June 3, 1914	December 11, 1962
Lehman, James A.	March 4, 1942	December 21, 1962
McCutcheon, Morton	May 10, 1937	July 26, 1962
Machella, Thomas E.	January 8, 1947	April 10, 1962
Mitchell, Charles F.	April 6, 1904	July 4, 1962
Ornston, Darius Gray	January 8, 1947	February 11, 1963
Sturgis, Margaret Castex	January 11, 1937	July 13, 1962
Tyson, Ralph M.	May 6, 1929	April 20, 1962
Ylvisaker, Lauritz S.	April 19, 1950	July 15, 1962

Non-Resident Fellows	*Date of Election*	*Date of Death*
Dunn, Charles W.	January 11, 1937	May 8, 1962
Pleasants, Henry, Jr.	November 1, 1922	February 7, 1963
Swenson, Paul C.	October 4, 1944	December 15, 1962

(*Suggested Form of Bequest*)

I hereby give, devise, and bequeath to the College of Physicians of Philadelphia, a charitable and educational association organized under the laws of the Commonwealth of Pennsylvania and the executive offices whereof are located in the City of Philadelphia, the sum of. . . . . .

a. which sum shall be used for the general purposes of said association;

b. which sum shall be added to and become a part of the general endowment fund of said association;

c. which sum shall be used by said association preferably for the following purposes:

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Founded 1787

1962

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† d.10 April 1962

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